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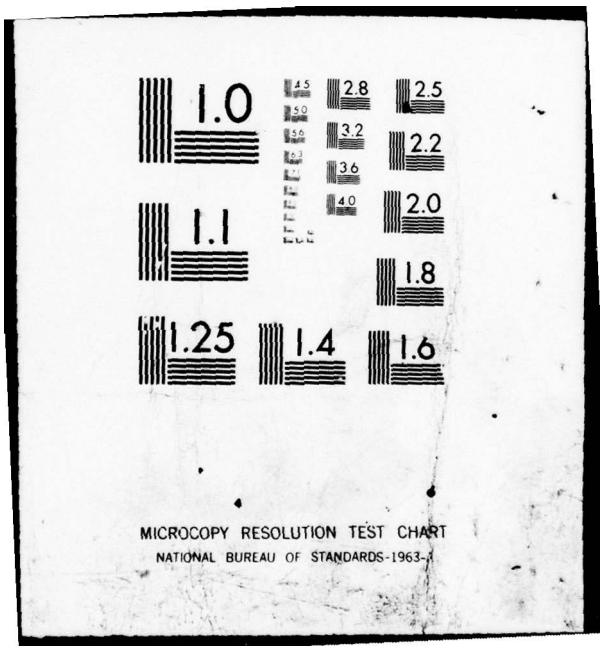
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NAVAL POSTGRADUATE SCHOOL

Monterey, California

THESIS

TACTICAL AIR THREAT

QUERY SYSTEM DEMONSTRATION

by

William Arthur George, Jr.

March 1979

Thesis Advisor: G. K. Poock

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Query AF was primarily directed towards the capability to rapidly present, update, assess, and disseminate the air threat. Other applications are foreseen in such areas as target intelligence and force status.

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TACTICAL AIR THREAT QUERY SYSTEM DEMONSTRATION

by

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Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

This work demonstrates an application of recent computer technology to the tactical air force intelligence field--Operations and Estimates. The demonstration integrates message handling, data manipulation, threat assessment and labeling, as well as graphic and visual displays into a battle management information system--Query AF.

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TABLE OF CONTENTS

LIST OF FIGURES

FIGURE

ACKNOWLEDGEMENT

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I. INTRODUCTION

A management information system, or MIS, is an integrated, man-machine system for providing information to support the operations, management, and decision-making functions in an organization. This type of system utilizes computer hardware and software, manual procedures, management and decision models, and a data base. The payoff for implementation of such a system lies in the improved efficiency by reducing cost, turnaround time, and by replacing clerical personnel. The rapid availability of reports, data, and decision models should also improve management and decision-making capabilities. Despite these benefits, the incorporation of the latest computer technologies into the Armed Forces of the United States has been slow. This has been historically attributed to cost and the complex acquisition process [1].

Today, rapid changes in computer technology are permitting low cost access to models, systems and data bases through the use of interactive terminals. The acquisition process is also being streamlined. As these facilities become cheaper, more flexible, and more powerful, they open up new opportunities for the services to use computers to assist in the management of their forces as well as supporting the decision process. One significant new development sparked by the latest technology is the availability of material and methods for more personalized systems. A manager now has a variety of building blocks which

he can use to make the resulting system his, under his own control, and tailored to his needs and convenience. This contrasts completely with the late 1960's when the tools were clumsy, monolithic, expensive, and accessible only through centralized electronic data processing units. Examples of these new building blocks and some of their applications are:

Hardware

1. General purpose time-sharing systems - Permit easy access to substantial computer power; allow faster development of systems, with closer involvement between technical specialist and manager.

2. Graphic terminals - Provide effective means for presenting large volumes of data in a meaningful format.

3. Desk-top or micro-computers - Provide inexpensive, personalized, and easily transported tools that may become as indispensable as pocket calculators.

4. Telecommunication networks - Extend the computer from "number-crunching" and data processing to message sending and data sharing; provide mutual access to information among decentralized organizational units.

Software

1. Data-base management systems - Extend range of information that can be collected; allow better access to existing data files; allow answers to relatively complex questions.

2. Specialized simulation and application languages - Reduce development time, especially for complex models and decision problems.

3. Application "packages" - Permit off-the-shelf installation of systems especially designed for particular types of application by parameter specification and thus fitting users' needs, background, and skills [2].

Although there are several ongoing efforts to exploit recent technology, those most closely associated with the topic at hand can be represented within the Air Force, Tactical Air Command (TAC). TAC, through the Tactical Air Warfare Center (TAWC) located at Eglin Air Force Base, Florida, has been introducing a variety of new concepts into the intelligence arena during the quarterly Blue Flag training exercises. Three such concepts are:

1. Combat Information Processing Van (CIPV) - An automated message handling system to process incoming intelligence reports and route each quickly to an appropriate analyst.

2. Dynamic Force Analysis (DFA) - A computer-based system which analyzes sensor derived data by autocorrelation functions, and presents the results to the monitor in a graphic/line print format.

3. Display and Control/Storage and Retrieval Equipment Description (DC/SR) - A computerized mobile system designed to enhance the capability of analysts to evaluate, correlate, collate, display, store, retrieve, produce, and disseminate intelligence to a tactical commander, staff and subordinate units. The major functions of the DC/SR are:

   a. Segment management (including log/journal functions)

   b. Operational intelligence analysis

   c. Data base maintenance

d. Defense situation analysis, target assessment and objective planning

e. Target data analysis, target development and weaponeering

f. Basic intelligence/summary reporting [3].

It is the purpose of this thesis to further emulate an application of computer technology within the operational field of intelligence. The major objective is to provide and demonstrate the concept of integrating many of the previously mentioned building blocks into a battle management information system on the enemy threat to friendly air operations. The system will demonstrate: message handling, data manipulation, threat assessment and labeling, as well as graphic/visual display of pertinent data.

II. INTRODUCTION TO THE PROBLEM

A. TACTICAL AIR FORCE INTELLIGENCE ACTIVITIES

Intelligence activities supporting the conduct of tactical air operations within a given theater headquarters, i.e., European Numbered Allied Tactical Air Force level or Tactical Air Control Center, can be categorized into two basic areas: Target Intelligence, and Operational and Estimate Intelligence.

Target intelligence is primarily concerned with the identification of targets for immediate and long term strike as well as restrike. These responsibilities require an extensive database of target development data, a close liaison with current operations and current plans to determine the availability of aircraft and ordnance loads, and an accurate assessment of the developing threat situation. Although this area of intelligence is not specifically addressed by this thesis demonstration, future applications within this area are foreseen.

Operational and Estimate Intelligence activities are the primary areas of interest with regard to this thesis. The associated activities within these areas include:

1. Monitor and analyze intelligence data contained in intelligence documents and incoming reports for new developments which could affect tactical air operations.

2. Prepare intelligence assessments, reports, and briefings necessary to keep the Commander and his Staff, Air Force Component Headquarters units, and appropriate higher and lateral headquarters informed of the current enemy air, ground, and naval situation.

3. Maintain a detailed research/reference library on the performance and characteristics of all communist weapons and control and support systems posing a potential threat, regardless of service allocation.

4. Prepare operational estimates for specific targeting and other operational purposes.

B. FLOW OF INTELLIGENCE DATA/INFORMATION [Figure 1]

Intelligence data and information utilized by the intelligence tactical community enters the Operational and Estimate Intelligence section from three primary sources. These sources include:

1. Communications Center - is the central receiving point for the bulk of incoming message traffic. Routine intelligence messages up through the Top Secret level are normally received through the communications distribution system. Inputs to the communications teletype system are made from all levels of command.

2. "Back Channel" - intelligence activities normally require the support of sensitive intelligence. For such cases, a communication network has been established to transmit, receive and disseminate sensitive intelligence. These channels have been colloquially referred to as "back channel". This data although handled separately, may parallel the communications center channels or can be received directly into the intelligence center. Unique intelligence collection systems may also have a near real time capability directly to the concerned intelligence area. Due to the sensitive nature of this area of intelligence and the

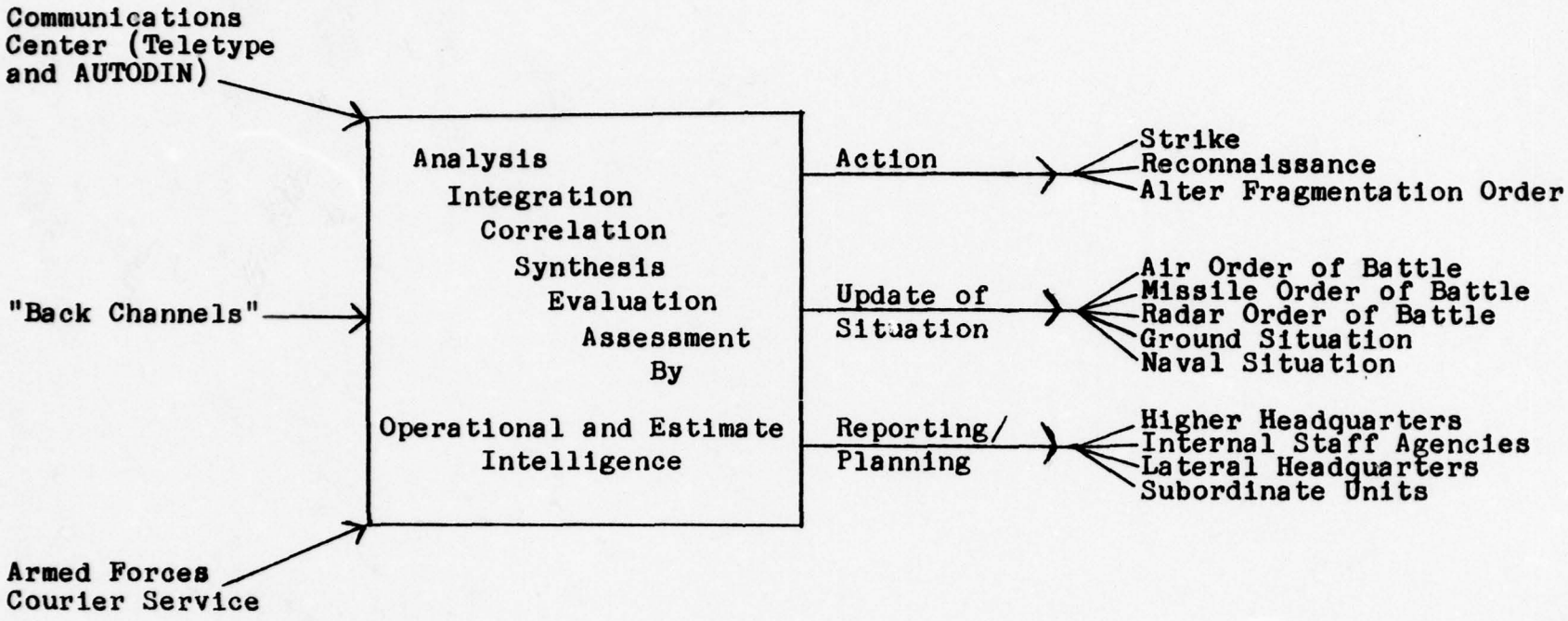


Figure 1 - Flow of Intelligence Data/Information

required security procedures, it has not been further exploited as part of this work.

3. Research/reference material - various intelligence documents and articles are kept on hand as reference materials for support of intelligence analysis. Such materials are normally received from higher headquarters in hard copy, organically developed as part of research and planning, or extracted from publications. Information of this type is of the long range nature. Dissemination is frequently via the U.S. Postal Service or the Armed Forces Courier Service (ARFCOS). Normally, if the data has a significant and continuous impact on the intelligence operations, special extracts of the pertinent information will be transcribed onto appropriate quick reference charts, maps, tables, etc.

Once the intelligence data is received within the Operational and Estimate section of intelligence, assigned personnel evaluate the new information in light of the existing data and make the appropriate changes to the enemy air, ground, and naval situation. The new assessment is then used for three broad purposes: Action, Update of the Situation, and Reporting.

1. Action - If the new information impacts significantly on current operations, it is used for immediate action. Such action could be the generation of a warning of impending enemy attack report, identification of targets for immediate strike or reconnaissance, or provision to alter or modify the daily attack plan (Fragmentation Order or FRAG).

2. Update of the Situation - All newly acquired intelligence data is logged into the intelligence section and used to update the appropriate areas. Key information and the current orders of battle are maintained on charts and map displays. A redundancy in wall displays is typically three fold due to the requirement to present the identical data to the Combat Staff - for current intelligence decisions; to the Operational Intelligence - for future reference, analysis and reporting requirements; and to the Targets section - for target development and planning purposes.

3. Reports/Planning - Operational and Estimate Intelligence is tasked with disseminating the threat assessment and the various enemy orders of battle to internal staff agencies, component headquarters units, and appropriate higher and lateral headquarters. The reports can be of an immediate nature such as a voice intelligence report (INTREP) or of a routine nature such as the daily intelligence summary (INTSUM). The reported data is utilized by the receiving agencies for planning and information purposes.

C. DISCUSSION OF THE PROBLEM

Operational and Estimate intelligence activities, as previously indicated, demand responses throughout the entire time spectrum. It would thus seem appropriate to discuss the time constraints and their impact on intelligence operations:

1. Current/Operational intelligence is of particular significance and importance to the air commander in executing tactical

air operations. This category of intelligence is highly event-oriented, providing immediate situation reports or action on a broad range of subjects and activities of interest to the tactical consumer. The need for timeliness of reporting generally precludes detailed evaluation or interpretation of the intelligence data.

The time sensitivity problem within this area is generally accentuated by the present manual methods for handling and dissemination of the day-to-day message traffic within a given organization. The present system is plagued by several man-generated queuing problems. Examples start with the runner system for delivering messages according to a time schedule and extend into the message preparation, coordination, and transmission procedures. It can be further stated that as tensions rise, message flow requirements expand and eventually exceed the system's handling capability. Automation of message handling has been adopted at various higher levels of command; however, within the time sensitive tactical air operations area, message handling automation remains in the test bed status.

2. Estimative intelligence falls at the opposite end of the time spectrum. Although it feeds on current intelligence, a considerable amount of additional time needs to be devoted to the analytical process - analysis, integration, correlation, synthesis, evaluation and assessment. The end product should be a predictive judgement on a probable course of action by a potential enemy. These intelligence estimates will establish the threat posture essential to the planning of future courses of action.

The time sensitive problem in this area is normally an extension of the current intelligence problem. As current intelligence functions start to get heavily taxed, the typical solution is the gradual shift of one's resources towards maximum effort to the problem at hand. These brush fire tactics frequently generate future planning problems at the expense of analysis. Thus, the time factor associated with a limited number of personnel generates management problems within the intelligence area.

Adding to the time problem is the requirement to maintain current and accurate intelligence data for reference and research purposes. These tasks include the updating and display of the various orders of battle throughout the intelligence operating areas. The redundancy in wall displays, referenced earlier, is manpower and time consuming, and lends to a potential area for error. The extra time and manpower could be better utilized for research and analysis of the on-going threat.

3. Finally, there is the universal problem of reporting in a timely and accurate manner. Having survived the delays in the receipt of data and having conquered the bookkeeping and analysis task, one is now faced with transmitting the estimate product.

The first hurdle encountered is the requirement to standardize the time coverage of the day-to-day reports and messages. The effective time on all messages for the organization are typically made to coincide with key briefing requirements within the organization or at higher levels. This requirement once again generates queuing problems as one competes within the organization

to get all his reports/messages coordinated and transmitted on time. Aggravating the problem is the extensive time required to draft, type and retype the same message/report. Once completed, the message is further subjected to the previously discussed communications center problems, not to mention the task of retyping for teletype transmission.

In summation, the Operational and Estimate intelligence activities are sensitive across the entire time spectrum. The timing factor is particularly sensitive within the Current/ Operational intelligence areas where intelligence managers frequently are forced to reallocate manpower and tasks in order to adequately satisfy the requirements at hand. These problems typically spill over into the Estimates intelligence activities. Feeding the overall time shortage problem is the current communications handling and dissemination methods, intelligence bookkeeping methods, message preparation techniques, and reporting requirements. It appears certain that neither time nor manpower will expand in the near future. Utilization of the present state-of-the-art automation technology can however help to eliminate many of our timing problems and stimulate a more efficient management of the data and available work force.

D. OBJECTIVE AND SCOPE

Having experienced the time and manpower sensitive requirements of the tactical intelligence field and having been recently exposed to the latest developments in computer technology, it is the intent of this writer to demonstrate an application of this computer technology within the operational field of tactical air

intelligence. The demonstration is not to represent the optimum utilization of the hardware and software presented; but rather, to merely illustrate how the state-of-the-art concepts can be applied to the discussed tactical problem areas.

This demonstration will emphasize the human interface capabilities with a structured data base query system. The data base is representative of those Warsaw Pact forces envisioned to oppose the United States Air Force and our North Atlantic Treaty Organization (NATO) allies within the European Theater. Two major classes of records are depicted:

1. Dynamic records (Aircraft, Missiles, Radars, and Ships), which have static properties such as name, type/model, class, country; and dynamic properties such as position, bearing, speed and range capability.

2. Static records (Airfields and Ports), with only static characteristics such as position, country, name, runway length and status.

A scenario of data base inquiry (query) and management was chosen from the tactical air force command and control environment. The format for the commands will approach that of a structured subset of English to simulate the natural use of English in the Air Force intelligence context while providing sufficient structure (through use of prompting) that the user should never be uncertain of what inputs the computer requires next.

The overall demonstration will be primarily directed towards the Air Force intelligence field - Operational and Estimate, and

its capability to rapidly present, update and assess the air threat. However, other applications are foreseen in such areas as Targets Intelligence and Force Status.

The data base query system will be coupled with a rapid message preparation and handling system which will demonstrate the state-of-the-art in this area.

III. HARDWARE DESCRIPTION

A. BASIC WORKSTATION AND ASSOCIATED HARDWARE

This chapter presents a brief description of the hardware components supporting Query AF. The term "workstation" has been adopted to represent the collection of terminal equipment/hardware tools utilized by a Query AF user as part of his interface with NLS (oNLine System). The workstation environment consists of a standard keyboard with Cathode Ray Tube (CRT), a line processor, and a standard graphics display terminal.

The workstation is connected to the host computer from the line processor via the ARPANET.

A diagramatic description of the hardware is presented in figure 2. For specific details on individual hardware components, reference should be made to the appropriate remaining sections of this chapter.

B. HOST COMPUTER - PDP-10

The host computer system utilized to support the Query AF program was the Digital Equipment Corporation (DEC) system. This is a general purpose, stored program computing system that includes at least one PDP-10 central processor, a memory with error-checking capability, and a variety of peripheral equipment. Each central processor is the control unit for an entire large-scale subsystem, in which it is connected by buses to random access storage modules and peripheral equipment, some of which may be shared with other central processors. Within a given system, the central processor

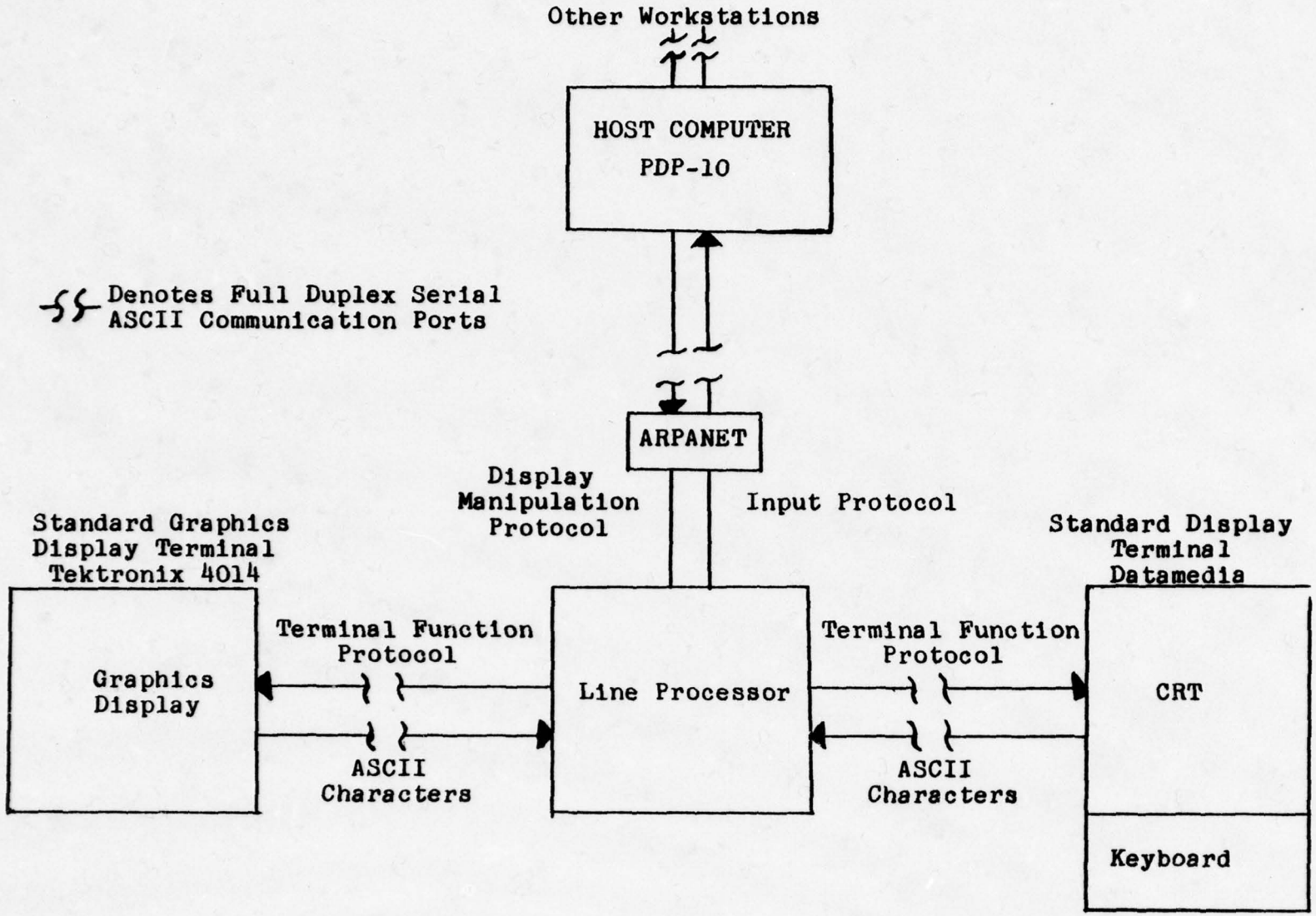


Figure 2 - Display Terminals, Line Processor and Main Computer Connections

governs all peripheral equipment, either directly or indirectly, sequences the program, and performs all arithmetic, logical and data handling operations.

Three types of PDP-10 central processors are the KL 10, the KI 10, and the KA 10. Query AF working in NLS (oNLine System) can run on all three processors. All the processors handle words of thirty-six bits stored in a memory whose maximum capacity depends upon the physical addressing capability of the processor. However, the physical capacity of the memory is not particularly relevant to a Query AF user as these processors are structured to operate in a sophisticated virtual memory environment. The fundamental virtual address is thirty bits, although no present processor is capable of using all of them. The virtual memory space is divided into sections of 256K each, whose locations are specified by the right eighteen address bits. Paging hardware further divides each section into 512 pages of 512 locations each. The actual size of the virtual address space for a given processor depends on how many out of the twelve possible section bits it implements. The addressing characteristics of the various processors are these:

	Extended KL10	Single-Section KL10	KI10	KA10
Physical address (no. of bits)	22	22	22	18
Physical memory capacity (no. of locations)	4096K	4096K	4096K	256K
Section bits implemented	5	0	0	0
Number of sections	32	1	1	1
Virtual address (no. of bits)	23	18	18	18
Virtual address space (no. of locations) [4]	8192K	256K	256K	256K

C. ARPANET SYSTEM

1. What is the ARPANET?

The ARPANET is an operational, resource sharing, host-to-host network linking a wide variety of computers at research centers sponsored by Defense Advanced Research Projects Agency (DARPA) and other DoD and non-DoD activities in continental United States, Hawaii, Norway, and England.

The ARPANET originated as a purely experimental network in late 1969 under a research and development program sponsored by DARPA to advance the state-of-the-art in computer internetting. The network was designed to provide efficient communications between heterogeneous computers so that hardware, software, and data resources could be conveniently and economically shared by a wide community of users. As the network successfully attained its initial design goals, additional users were authorized access to the network. Today, the ARPANET provides support for a large number of DoD and non-DoD government projects with an operational network of many nodes and host computers.

Following the successful accomplishment of initial ARPANET design goals and the expansion of the network, it was considered appropriate to transfer the responsibility for operation of the ARPANET from DARPA to the Defense Communications Agency (DCA). In July 1975, the DCA became the operational manager of the ARPANET [5].

2. Brief Description of the ARPANET.

The ARPANET is an operational, computerized, packet switching DoD digital network which provides a capability for

terminals or geographically separated computers, called hosts, to communicate with each other. The host computers often differ from one another in type, speed, word length, operating system, and other characteristics. Each terminal of a host computer is connected into the network through a small local node computer called an Interface Message Processor (IMP) or Terminal Interface Processor (TIP). The complete network is formed by interconnecting the IMPs and TIPs through wideband communication lines (normally 50,000 bits per second) supplied by common carriers. Figure 3 illustrates an example of geographic coverage by the ARPANET.

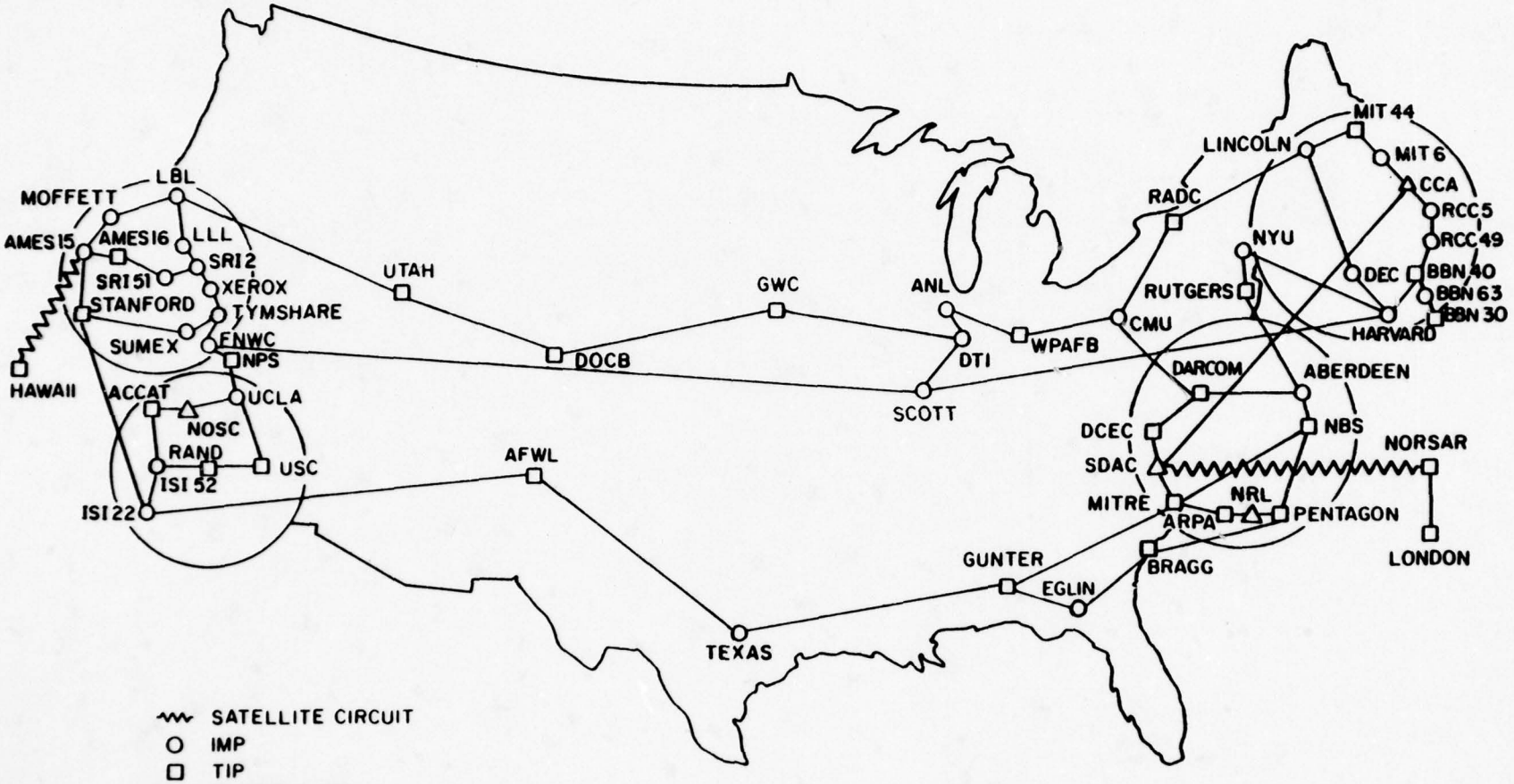
Each node is programmed to receive and forward messages to the neighboring nodes in the network. During a typical operation, a host passes a message to its node; the message is passed from node to node through the network until it finally arrives at the destination IMP, which in turn passes it along to the destination host. This process normally takes less than 250 milliseconds.

Users of the ARPANET may access local or distant SERVER computers (hosts) over the network. They may also exchange messages, create realtime links between users, transfer files from one computer to another, and submit batch jobs to distant computers [4].

3. Utilization of the ARPANET.

The ARPANET was utilized within the context of this work to demonstrate the capability for geographically separated military units (representing higher, lateral and subordinate authorities)

ARPANET GEOGRAPHIC MAP, JANUARY 1979



(NOTE: THIS MAP DOES NOT SHOW ARPA'S EXPERIMENTAL SATELLITE CONNECTIONS)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

Figure 3 - Adapted from reference 5

to communicate, computer to computer, with each other. This capability is particularly important considering the computers located throughout a theater of operation may well differ from one another in type, speed, word length, operating system, etc.

D. LINE PROCESSOR

The line processor is a microcomputer device residing in the transmission line between the display terminals and the main computer. Since it has processing capabilities, it can appear to the main computer as almost any kind of terminal. It performs all necessary line protocol and communication supervision.

The line processor was developed by the Augmentation Research Center (ARC) of Stanford Research Institute as a microcomputer-based device that makes any of a class of alphanumeric display terminals useful as a high quality two-dimensional interactive workstation. These workstations serve ARC's interactive information manipulation system, NLS (oNLine System).

The line processor as developed by ARC supports a mouse pointing/cursor device and a five-finger keyset, and requires no hardware modifications either to the display terminal or to the main computer. Within the operational context of this thesis, the mouse and keyset were not utilized. Although the dynamic flexibility of the line processor originates from these two devices, they are primarily designed as hardware tools to interact with the software program NLS. Since Query AF is a final product working under NLS but not requiring all NLS display functions, these devices (the mouse and keyset) have been

eliminated. It should be noted however that both devices were required for the development of Query AF on NLS.

The line processor is utilized as part of the Query AF hardware primarily in support of the graphics display terminal. The Display Manipulation protocols are sent by the applications program to the Line Processor to change the graphics display image. It does not affect the graphics display terminal directly, but is translated by the microcomputer into the Terminal Function protocol.

The display manipulation protocol is designed to work with any alphanumeric terminal with cursor control and line editing functions such as delete line and insert line.

The line processor "talks" to the display terminals in the terminal function protocol. This is defined by the terminal manufacturer and usually consists of ASCII control codes, or sequences of control codes, interspersed with ASCII text to be written on the display screen.

The line processor workstation serves as both a timesharing system typewriter terminal and an applications system display output terminal. Hence, there are potentially two streams of output going from the main computer to the line processor on the same communications line: the display manipulation protocol, and the teletypewriter terminal output that the timesharing system or applications programs send. The teletypewriter output would be generated if the user was using the terminal as a typewriter terminal, or if the user received an error message or some type of system-wide message. These two streams of output

are displayed in a TTY-simulation area. This means that the teletypewriter output is not scrambled in with the display output, but it is scrolled -- teletypewriter fashion -- in a small portion of the screen. The applications program has control over the size and location of the TTY-simulation area [6 & 7].

If a user opts to use Query AF without the support of a graphics display, the line processor can be eliminated.

E. CRT - DATAMEDIA VIDEO TERMINAL

The specific Cathode Ray Tube (CRT) utilized with the described workstation is optional. The limiting factor is a video terminal which is a stand-alone separable terminal containing an alpha-numeric display, keyboard, storage, control logic and an asynchronous communications interface. Datamedia has produced a variety of these terminals which are in use with this type of workstation.

A Datamedia Elite 1520A is a specific example of a useable terminal with the Query AF setup. In addition to the above capabilities, it has the following features:

Quiet operation
Editing plus roll mode
50 to 9600 Baud
80 characters per line
no end of line hangups
Upper/Lower Case
addressable cursor
tape mode
greater reliability
electronic keyboard
modular construction to facilitate maintenance
computer or operator-controlled printer output
fixed tab [8]

F. STANDARD GRAPHICS DISPLAY TERMINAL - TEKTRONIX 4014

The Tektronix 4014 is a storage tube graphics display system. It has as its display medium a 19 inch flicker-free storage tube. Also associated with the 4014 is a standard ASCII keyboard, a set of thumb wheels and a joystick. The latter two devices can be used for positioning a display cursor, thus allowing a user to input graphics information "through the display".

The 4014 has several modes of operation, some of which include: alphanumeric, vector, incremental plot, and dashed or dotted vector. The Query AF program does not utilize the incremental plot mode of operation.

Specific Tektronix capabilities include:

Display medium - Direct View Bi-Stable Storage CRT
Display area - 15 inches (38.1cm) wide by 11 inches (27.9cm) high
Four Alphanumeric Mode Formats

1. 74 Characters per line with 35 lines per display
2. 81 " " " " 38 " " "
3. 121 " " " " 58 " " "
4. 133 " " " " 84 " " "

Alpha-numeric cursor - 7x9 dot pulsating cursor
Vector drawing time is 5000 inches per second
Normal graphics - 1024(X) by 1024(Y) addressable points
Enhanced graphics mode - 4096(X) by 4096(Y) addressable points

IV. SOFTWARE DESCRIPTION

The software description chapter specifically addresses the software packages utilized by the Query AF user. A unique layering or subset effect is involved among the various programs. The respective programs are briefly discussed in decending order with the software first encountered being discussed first. Query AF, part E, is discussed in considerable detail.

A. TENEX

TENEX is the time-sharing operating system on ARC's Digital Equipment Corporation PDP-10. The NLS (including Query AF) program runs as a subsystem of TENEX. Figure 4 illustrates the NLS - TENEX relationship.

TENEX offers the user three distinct facilities. First, TENEX contains a number of subsystem entities, each of which does a particular job. Some subsystems, such as NLS provide complete computation services, are highly self-contained, and require little knowledge of the remainder of TENEX or of the PDP-10 computer. Other subsystems do specific jobs such as editing or compilation, are typically used together with other subsystems, and require of the user more complete knowledge of TENEX.

Distinct from its subsystems, TENEX offers an entity, known as a virtual computer, that gives the user a vehicle for running machine language programs. This entity is termed a "computer" because it has all the appearance of a piece of computing hardware, "virtual" because some of this appearance is in fact

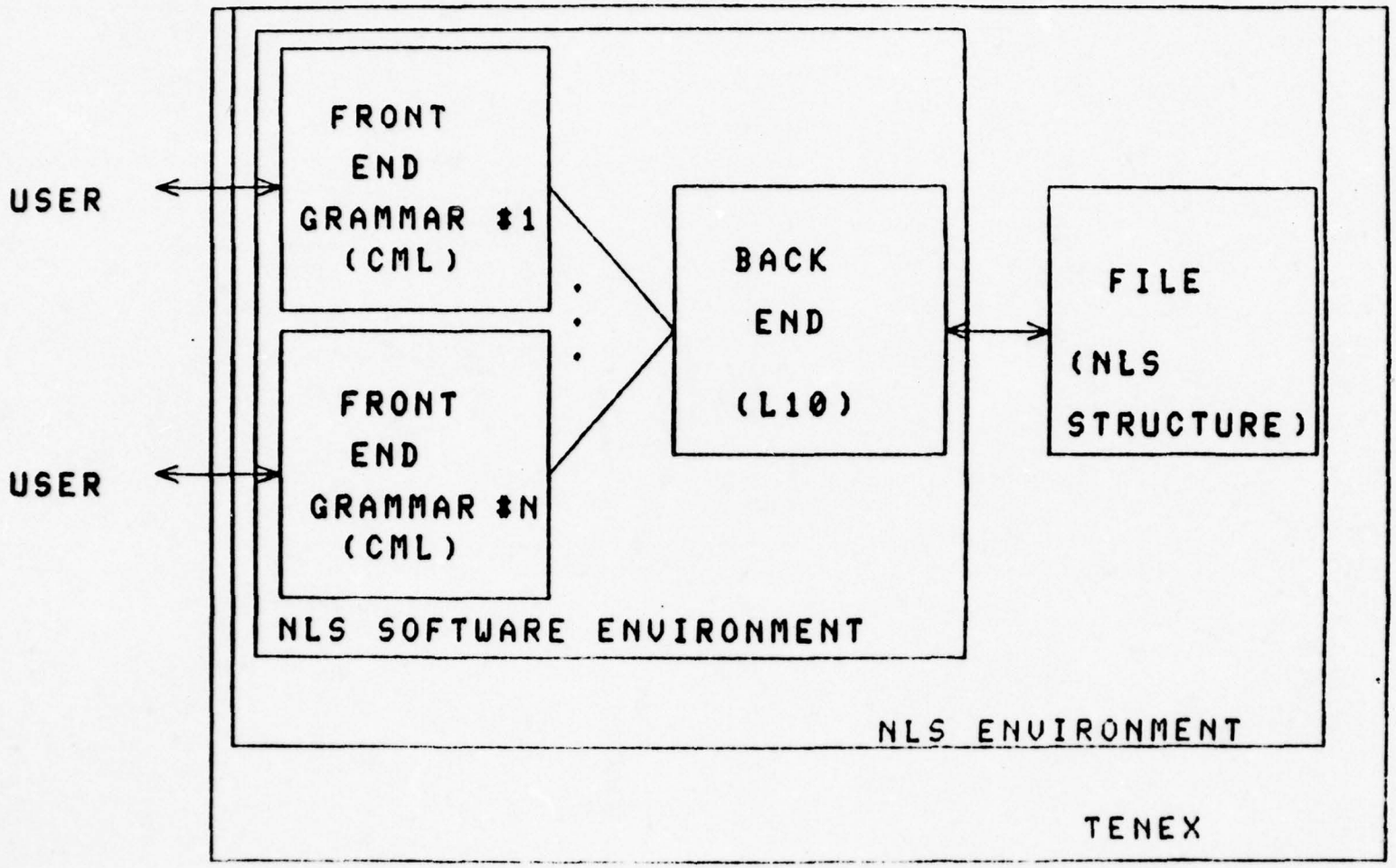


Figure 4 - NLS - TENEX Environment Relationship

supplied by the system software that controls and drives TENEX. In particular, the virtual computer provides what appears to be a more powerful core memory structure and input-output system than actually exists in the PDP-10 hardware. The language of the TENEX virtual computer contains a subset of the PDP-10 machine language, together with a series of calls on the TENEX software system, known as "JSYS's".

The third facility offered by TENEX is a file system that also provides access to and control over the various input and output devices in the system. TENEX files can be kept on disk, magnetic tape, and DECtape. The paper tape reader and punch and the line printer are also treated as files, and terminals can, if desired, be accessed through the file system. The ARPA network connections also look like files to the user [9].

B. NLS (oNLine System)

NLS is a sophisticated modular software system originally developed at Stanford Research Institute, but now supported and under continuing development by TYMSHARE Corporation. NLS allows creation, storage, retrieval, processing, and transfer of text or other symbolic material. This material can be extensively manipulated online, and can be input and output in various forms.

The system provides a basic "intellectual workshop" for planning, communication, and coordination. The structural tree-like nodes in an NLS file point to a list of properties which contain data. The most common property type is textual, but other types are graphical, numerical and specially formatted data blocks used by particular application packages. The files can

also contain inter- and intrafile links between nodes that allow the user's view to move either down through a tree or along links. NLS is structured in a modular fashion so that new tools can easily be added, and also so that NLS modules can run on other computers in the ARPANET and still communicate with NLS at Stanford Research Institute's Augmentation Research Center (ARC). Commands to the various modules can enter the system from online consoles or from control files.

Programming languages are available that take source code directly from NLS structured files for use in the creation of the modules [5].

NLS is the principle software system supporting Query AF. The NLS system runs as a subsystem to TENEX, the time-sharing system on ARC's Digital Equipment Corporation PDP-10. The PDP-10 was connected to the ARPA network, the means by which user interface was made. NLS, as utilized in this thesis was architecturally made up of two parts. The frontend of NLS deals with the user interface and was written in Command Meta Language (CML). The backend of NLS handles the execution functions and was written in L10 language. The NLS software environment is illustrated in Fig. 4.

C. L-10 (LANGUAGE 10)

Language 10 (for DEC-10), a special-purpose, ALGOL-like compiler for generating NLS programs on the DEC-10. It contains high level features for operation such as string analysis and manipulation which are implemented in the language as calls on

library routines. L-10 has basic constructs such as local variables and fields. The L-10 compiler was written using the compiler-compiler system called Tree Meta [4]. L-10 was utilized to handle the execution functions within the backend of NLS as well as the parts of the frontend which are not written in CML.

D. CML (COMMAND META LANGUAGE)

The Command Meta Language, a high level, formal language, is designed especially for implementing user command languages for interactive systems. Its flexible and straight-forward conventions allow the programmer to create a consistent and coherent user interface across applications programs or "tools".

It provides the means to easily create, change, and experiment with the user interface to an interactive tool. Commands available to the user and the interaction methodology and techniques used to specify commands are manipulated independently. Changes in command words, command word structure, prompts, and noise words are simply made, usually requiring little more than trivial edits to the CML program [10].

CML was the language used to write the grammars defining the user interface in the NLS frontend.

E. QUERY AF

1. Introduction

Query AF is a self-documenting demonstration of the human interface capabilities with a structured database by means of NLS. A scenario of database inquiry (query) and management was chosen as a typical example from the Air Force tactical

intelligence (Operational and Estimate) and command and control environment. The format for the commands approach that of a structured subset of English to simulate the natural use of the English language in the Air Force intelligence context while providing sufficient structure (through the use of prompting) that the user will never be uncertain of what inputs the computer requires next. In this way, the human interface is accomodated leading to increased user acceptance.

2. Background

Query AF is an Air Force intelligence oriented extension to the Query3 program. The program was initiated and developed as part of the requirements for a Master of Science degree at the Naval Postgraduate School. Guidance and support was contributed by the Naval Ocean Systems Center while key programming was accomplished through TYMSHARE, Inc.

Query3 program itself represented a logical growth from the Query2 and original Query program. Query3 like its predecessors was highly Navy oriented with the use of 30 commands to manipulate a dynamic database of over 500 ships, a few airplanes, and 130 ports spread over two oceans. Query AF represents an extension more applicable to the tactical Air Force intelligence situation. Query3 commands have largely been retained but reoriented. In contrast to Query3's hemispheric databases, Query AF has restricted its database to portions of the Southern Region of Europe including North Africa. The QueryAF database represents examples of the Warsaw Pact forces envisioned to oppose the United States Air Force and our North Atlantic Treaty

Organization (NATO) allies within this area of interest. The database includes 310 airfields, over 2,000 aircraft, 200 missile sites, 66 ports, and 40 radar sites.

3. Database Content

The database consists of two general types of records:

a. Static Records:

Static records, i.e. PORTS and AIRFIELDS, have only static characteristics such as name, flag, status, position, class and in the case of airfields, runway length.

(1) Ports

The port database centers around Italy and includes ports from adjacent Mediterranean littoral countries.

Listings of major naval bases in the appropriate countries was extracted from the Almanac of World Military Power [11]. Geographic coordinates were obtained from Jet Navigation Maps and the McGraw-Hill International Atlas. Depicted ports are listed in Appendix A.

(2) Airfields

The airfield database focuses on the NATO country Italy, located in the Southern Region of NATO. Warsaw Pact countries represented include Bulgaria, Czechoslovakia, Hungary, Romania and selected portions of the Soviet Union. In addition, the countries of Albania, Algeria, Libya, Tunisia, and Yugoslavia have been included.

Airfields within the Soviet Union were selected from only the southwestern portion of the country. Specifically, no airfields were selected north of 51 degrees north latitude or east of 35 degrees east longitude.

Airfields within the above mentioned countries, having at least one runway in excess of 4,000 feet in length, have been included in the database. Contributing sources include the Almanac of World Military Power [11], Armed Forces of the World [12], Jet Navigation Charts (JNC), and the DoD Flight Information Publication (terminal) Low Altitude Europe, North Africa, and Middle East, Vol. 1 and 2 [13] provided by the Defense Mapping Agency (DMA).

Airfield runway length data for airfields not listed within the DMA terminal publication was estimated by comparison calculations. Runway length measurements were made of ten DMA listed airfields from a JNC. The total DMA listed runway lengths were then divided by the total map measured lengths thus providing a constant for future estimate calculations, i.e., 1 map measured unit = X feet of actual runway length. Spot checks with other known runway lengths proved this to be a sufficiently accurate estimate. Depicted airfields are listed in Appendix B.

b. Dynamic Records:

Dynamic records such as AIRCRAFT, NAVAL VESSELS, MISSILES, and RADARS are relocatable and have a mixture of both static and dynamic characteristics. Examples of static characteristics include name, flag, type, category, and class. Dynamic characteristics include operational control assignment, position, bearing, speed, and range capabilities.

The database within this area represents examples of the Warsaw Pact forces envisioned to oppose the United States Air Force and our NATO allies within the Southern Region of

Europe. All facts and figures are unclassified; as such, they do not necessarily represent the absolute characteristic or performance capability of the respective platform. Support data and facts were extracted from and represent a composite picture from the following sources: Janes All The World Aircraft [14], Janes Weapon Systems [15], Janes Fighting Ships [16], Gallery of Soviet Aerospace Weapons [17] and the Armies of the Warsaw Pact Nations [18]. The above referenced documents plus World Combat Aircraft Directory [19] were used as a guide to seed the database. Specific examples of the data used are in Appendix C.

4. Definitions of Air Force and QueryAF Terms

For the benefit of the users, definitions of some terms relevant to the Query AF task domain are included here:

a. Category - A functional classification assigned to a platform to indicate its use. Examples include:

(1.) BOMBER - BHC,BHD,BHN,BMC,BMD,BMN,BLC,BLD,BLN
(2.) CARRIER - CV,CVN,CVA,CVAN
(3.) CRUISER - CA,CG,CGN,CHG,CLG,CLGN
(4.) DESTROYER - DD,DDG
(5.) FRIGATE - FF,FFG
(6.) FIGHTER - FDA,FDC,FDT,FTM
(7.) FIGHTER BOMBER - FGC,FGD,FGN,FGT,FTM
(8.) HELICOPTER - HHC,HLA,HLC,HMA,HMC
(9.) MISSILE - AAM,ASM,ATM,FROG,SAM,SSM
(10.) RADAR - EW,GCI
(11.) RECONNAISSANCE/ECM - BHR,BHE,BMR,BME,BLR,BLE,EWR,FTR, FTE,THE,TME,TLE
(12.) TRAINER - BMT,FDT,FGT,FTT
(13.) TRANSPORT - THC,TLC,TMC

b. Name - In the case of a naval vessel it can be a specific name designated for the vessel. In most cases involving aircraft, missiles and radars, it will represent the NATO code-name for the system or the appropriate abbreviation.

c. Type - Is a subset of CATEGORY. It more specifically addresses the mission responsibilities of the platform as well as indicating some of its general capabilities. For example, the aircraft category FIGHTER indicates an interceptor role while the type FDA denotes it is a defensive fighter with all-weather capability.

Specific examples of the type codes utilized with Query AF and their brief description are:

TYPE CODE	DESCRIPTION
AAM	AIR TO AIR MISSILE
ASM	AIR TO SURFACE MISSILE
ATM	ANTI TANK MISSILE
BHC	BOMBER HEAVY CONVENTIONAL
BHD	BOMBER HEAVY DUAL CAPABLE (NUC & CON)
BHE	BOMBER HEAVY ECM
BHN	BOMBER HEAVY NUCLEAR
BHR	BOMBER HEAVY RECONNAISSANCE
BLC	BOMBER LIGHT CONVENTIONAL
BLD	BOMBER LIGHT DUAL CAPABLE (NUC & CON)
BLE	BOMBER LIGHT ECM
BLN	BOMBER LIGHT NUCLEAR
BLR	BOMBER LIGHT CONVENTIONAL
BMC	BOMBER MEDIUM CONVENTIONAL
BMD	BOMBER MEDIUM DUAL CAPABLE (NUC & CON)
BME	BOMBER MEDIUM ECM
BMN	BOMBER MEDIUM NUCLEAR
BMR	BOMBER MEDIUM RECONNAISSANCE
BMT	BOMBER MEDIUM TRAINER
CA	HEAVY CRUISER
CG	GUIDED MISSILE CRUISER
CGN	NUC POWERED GUIDED MISSILE CRUISER
CHG	HELICOPTER CRUISER WITH GUIDED MISSILES
CLG	GUIDED MISSILE LIGHT CRUISER
CLGN	NUC POWERED GUIDED MISSILE LIGHT CRUISER
CV	AIRCRAFT CARRIER
CVN	NUC POWERED AIRCRAFT CARRIER
CVAN	NUC POWERED ATTACK AIRCRAFT CARRIER
DD	DESTROYER
DDG	GUIDED MISSILE FRIGATE
EW	EARLY WARNING RADAR
EWR	EARLY WARNING RECONNAISSANCE
FDA	FIGHTER DEFENSIVE ALL-WEATHER
FDT	FIGHTER DEFENSIVE TRAINER

FDC - FIGHTER DEFENSIVE CLEAR-AIR-MASS
FDT - FIGHTER DEFENSIVE TRAINER
FF - FRIGATE
FFG - GUIDED MISSILE FRIGATE
FGC - FIGHTER GROUND ATTACK CONVENTIONAL
FGD - FIGHTER GROUND ATTACK DUAL CAPABLE (NUC & CON)
FGN - FIGHTER GROUND ATTACK NUCLEAR
FGT - FIGHTER GROUND ATTACK TRAINER
FROG - FREE ROCKET OVER GROUND
FTE - FIGHTER TACTICAL ECM
FTM - FIGHTER TACTICAL MULTI-ROLE (AIR DEF & GND ATTACK)
FTR - FIGHTER TACTICAL RECONNAISSANCE
FTT - FIGHTER TACTICAL TRAINER
GCI - GROUND CONTROL INTERCEPT RADAR
HHC - HELICOPTER HEAVY CARGO
HLA - HELICOPTER LIGHT ATTACK
HLC - HELICOPTER LIGHT CARGO
HMA - HELICOPTER MEDIUM ATTACK
HMC - HELICOPTER MEDIUM CARGO
SAM - SURFACE TO AIR MISSILE
SSM - SURFACE TO SURFACE MISSILE
THC - TRANSPORT HEAVY CARGO
THE - TRANSPORT HEAVY ECM
TLC - TRANSPORT LIGHT CARGO
TLE - TRANSPORT LIGHT ECM
TMC - TRANSPORT MEDIUM CARGO
TME - TRANSPORT MEDIUM ECM

d. Class

A term applicable to dynamic enemy platforms that were constructed to nearly identical specifications. Class is a further subdivision of a dynamic enemy platform's type. For example:

PLATFORM...Aircraft

CATEGORY...Fighter (interceptor)

TYPE...FDC (air defense fighter clear air mass only)

CLASS...Foxbat A

All members of the Foxbat A class will have essentially the same dimensions, operational performance capabilities, and carry the same armament. Appendix C provides a complete break down of all Query AF classes for the dynamic enemy platforms: aircraft, naval vessel, radar, and missile.

All dynamic friendly platforms have the class name equal to the type of platform. For example, a friendly aircraft would have the class name aircraft, a friendly radar must have the class name radar, etc. The class differentiation between enemy and friendly platforms is required to accommodate the threat analysis algorithm.

Static friendly platforms, ports and airfields, also require a class designation in order to properly execute the threat analysis algorithm. In this case, class does not infer that all ports and airfields are alike. A port's class is simply port and an airfield's class is airfield. Failure to enter the class for a particular port or airfield will nullify threat computations against that particular static platform.

e. Course or Bearing

The direction in degrees (modulo 360) in which a platform is traveling or pointed.

f. Flag Code

The Nationality of a platform is represented in the FLAG field of the platform record by a two letter code.

(1) Nation codes for 30 countries, alphabetically by country name:

NATION/CODE LIST:

NATION	CODE
ALBANIA	AL
ALGERIA	AG
AUSTRIA	AU
BELGIUM	BE
BULGARIA	BU
CYPRUS	CY
CZECHOSLOVAKIA	CZ

DENMARK - DE
EAST GERMANY - GE
EGYPT - EG
FRANCE - FR
GREECE - GR
HUNGARY - HU
ISRAEL - IS
ITALY - IT
LEBANON - LE
LIBYA - LI
MOROCCO - MO
POLAND - PL
PORTUGAL - PO
ROMANIA - RO
SOVIET UNION - UR
SPAIN - SP
SYRIA - SY
TUNISIA - TN
TURKEY - TU
UNITED KINGDOM - UK
UNITED STATES - US
WEST GERMANY - GW
YUGOSLAVIA - YO

(2) Nation codes for 30 countries, alphabetically by code:

CODE/NATION LIST:

CODE	NATION
AG	ALGERIA
AL	ALBANIA
AU	AUSTRIA
BE	BELGIUM
BU	BULGARIA
CY	CYPRUS
CZ	CZECHOSLOVAKIA
DE	DENMARK
EG	EGYPT
FR	FRANCE
GE	EAST GERMANY
GR	GREECE
GW	WEST GERMANY
HU	HUNGARY
IS	ISRAEL
IT	ITALY
LE	LEBANON
LI	LIBYA
MO	MOROCCO
PL	POLAND
PO	PORTUGAL

RO - ROMANIA
SP - SPAIN
SY - SYRIA
TN - TUNISIA
TU - TURKEY
UK - UNITED KINGDOM
UR - SOVIET UNION
US - UNITED STATES
YU - YUGOSLAVIA

g. Latlong

A geographic position is entered into Query AF as 3-5 digits followed by N or S to represent latitude, followed by an optional slash, followed by 3-5 digits and E or W to represent longitude. N/S/E/W can be capitalized or not. Space characters must not be embedded in LATLONG. Failure to follow this convention will result in rejection of the input and the printing of an error message.

h. Operational Control

The operational control of the platform refers to the unit or point from which the platform receives its orders. Missiles and radars reference their assigned unit/sector respectively, naval vessels reference a port if in port or the name of the commander if at sea, aircraft reference their operational airfield.

i. Platform

The atomic entity in the database. A platform can be either a Port, Airfield, a Naval Vessel, an Aircraft, a Missile or a Radar.

j. Range

Range is measured in kilometers. Due to the variation in type of platforms involved, range is separately defined

for each. Naval vessel range is the maximum cruising distance the vessel can travel unrefueled. Missile range is the maximum distance the missile can travel and still be lethal to the target. Radar range refers to the detection capability of the radar. Aircraft range is the operational radius for the aircraft and not the maximum ferry range or one way capability.

k. Squadron

A collection of geographically close aircraft that travel together or perform the same type of mission.

l. Task Force

A collection of geographically close naval vessels that travel together or perform some mission (task).

5. Commands In The Query AF Subsystem

a. Important Query Commands

These commands form the backbone of the actual "Query" function of the Query AF subsystem. They allow the user to extract the information s/he needs from the database, and to specify how s/he wants it formatted.

(1) Find (All)...

The Query AF command "Find" enables one to directly enter the following records:

a. Aircraft: Find (all) Aircraft (with):
b. Airfields: Find (all) Airfields (with):
c. Class: Find (all) classes (with):
d. Missiles: Find (all) Missile (Installations) (with):
e. Naval vessels: Find (all) Naval (vessels) (with):
f. Platforms: Find (all) Platforms (with):
g. Ports: Find (all) Ports (with):
h. Radars: Find (all) Radar (Installations) (with):

Data within each of the above records can be further discriminated based on the use of any of the following alternatives in conjunction with the "Find" command:

1. At (range of)
2. Between
3. Category
4. Class
5. Course
6. Depth
7. Farthest (in Km)
8. Flag
9. Guns
10. Hull Number
11. Labels
12. Length
13. Missiles
14. More (than Km)
15. Name
16. Nearest (in Km)
17. Not
18. Bombs
19. Position
20. Speed (Km/hr)
21. Synonym
22. Type
23. Width
24. Within (Km)
25. Rockets
26. Satisfying
27. Threat (to):...Interceptor Threat to Aircraft, Surface to Air Threat to Aircraft, Radar Threat to Aircraft, Conventional Air Attack Threat to Airfield, Nuclear Air Attack Threat to Airfield, or Surface to Surface Nuc/Con Threat to Airfield.
28. Tail Number
29. Model Number
30. Specific Model
31. Unit Assignment
32. Sector Assignment
33. Port Location
34. Airfield Location

An example of the above: Find (all): aircraft (with): airfield location (user names the airfield).

(2) List

The Query AF command "List" allows one to directly list:

a. Threat (to):...Interceptor Threat to Aircraft, Surface to Air Threat to Aircraft, Radar Threat to Aircraft, Conventional Air Attack Threat to Airfield, Nuclear Air Attack Threat to Airfield, or Surface to Surface Nuc/Con Threat to Airfield.
b. Current (values for field)
c. Diagrams
d. Legal (values for field)
e. Parameter (settings)
f. Search (Criteria)

(3) Show

The Query AF command "Show" is the most versatile command. It allows the user to interrogate the database and show these various fields:

a. All (platforms)
b. Aircraft
c. Airfields
d. Class
e. Flag
f. Foreign platforms
g. Groups (labelled)
h. Missiles
i. Naval vessels
j. Platform
k. Ports
l. Radars
m. Squadron
n. Task (Force)
o. The (one)
p. Unknown (platform)
q. US (platforms)
r. Threat (to):...Interceptor Threat to Aircraft, Surface to Air Threat to Aircraft, Radar Threat to Aircraft, Conventional Air Attack Threat to Airfield, Nuclear Air Attack Threat to Airfield, or Surface to Surface Nuc/Con Threat to Airfield.
s. Collection (of):...Aircraft (located at airfield), Naval (vessels located at port), Radars (assigned to sector), or Missiles (assigned to unit).

To the casual observer, the Find and Show commands appear to be very similar. This is not the complete case. The following clarification is thus provided.

The Find command is a broader more general command that addresses all elements of the specified category

(aircraft, airfield, naval vessel, missile, radar, class, or platform). It is designed to select the category and then further discriminate (one or more times) within the category.

The Show command is more specific. The user is afforded a direct access to individual elements of the category or can print out the entire category. The following queries highlight the differences:

a. If the user wants a specific element of the category naval vessel, such as the Kiev.

Find (all) C: Naval vessels (with) C: Name C: Equal (to) T/[A]: Kiev

Show C: Naval vessel T/[A]: Kiev

b. If the user wants a specific class within the category class, such as Hercules class.

Find (all) C: Classes (with) C: Name C: Equal (to) T/[A]: Hercules

Show C: Class T/[A]: Hercules

Note, either command will get the same answer, the Show command is just faster because it assumes you know specifically what you want.

c. If the user wants the names of all airfields.

Find (all) C: (cannot be obtained by the Find command)

Show C: Airfields OK/C:

d. If the user is not specifically certain of the elements involved, the Find command is used. If the user was interested in all USSR aircraft within 500 kilometers of your position.

Find (all) C: Aircraft (with) C: Flag C: Equal (to) T/[A]:

UR OK/C: And C: Within T/[A]: 500 C: Kilometers (of) C: me OK/C:

Show C: (cannot be obtained by the Show command)

b. Position and Distance Manipulation Commands

These commands deal with the absolute and relative geographical positions of the platforms in the database (including the user himself).

(1) Compute...

The Query AF command "Compute" provides two methods of relating the positions of two platforms in the database. The first provides the physical distance between the platforms and the relative bearing of the first with respect to the second. The second method yields the time required for the two platforms to be brought together.

a. Distance: Compute Distance to position (LATLONG)...

b. When the time relation is chosen, the motion of the platforms is prompted for. The user must select one of the three rational possibilities:

1. The first platform moving toward the second with the second stationary.
2. The second moving toward the first with the first stationary.
3. Both moving toward each other.

If the fourth possibility is chosen (both moving away from each other) a system error will be generated.

c. New: Compute New (position at distance) NUM (and bearing) NUM (from old position) LATLONG.

(2) How (far is platform) (from) in

The Query AF command "How" (far...) determines the distance and bearing of one platform with respect to another, or the time that would be required for them to effect a rendezvous.

(3) My (position is) LATLONG OK

The Query AF command "My" allows the user to modify his position ("Where" reports current position). LATLONG - a geographic position is entered into Query AF as 3-5 digits followed by N or S to represent latitude, followed by an optional slash, followed by 3-5 digits and E or W to represent longitude. N/S/E/W can be capitalized or not. Space characters must not be embedded in a LATLONG. Failure to follow this convention will result in rejection of the input and the printing of an error message.

(4) Put (craft) Name (at port/airfield)...

The Query AF command "Put" relocates a specified platform at a specified port/airfield. The user thus does not have to explicitly know the port/airfield's LATLONG.

(5) Where (am I) OK

The Query AF command "Where" reports the user's position (specified when s/he entered Query AF, or respecified by the "My" command). This position is also used as the reference for database commands such as "show the platforms nearest me".

c. Opcon and Task Force/Squadron Manipulation Commands

These commands reflect the task force structure or squadron structure; the user can use them to create, augment, deplete or terminate task forces/squadrons or to show operational control for a platform.

(1) Assign...

The Query AF command "Assign" brings a given platform under the operational control of a specific Unit, Airfield, or Port. In addition, this command provides a synonym capability so that a specific platform (such as the FISHBED aircraft) can also be referred to by a synonym (such as Mig-21).

a. Command: Assign Command to platform/class NAME.

b. Synonym: Assign Synonym NAME to platform/class NAME.

(2) Deassign...

The Query AF command "Deassign" works in opposition to the "Assign" command.

(3) Attach (opcon) OPCON (platform) NAME (Finished?) ...Yes OK

The Query AF command "Attach" changes the operational control of one or more specified platforms.

(4) Detach (opcon)...

The Query AF command "Detach" works in opposition to the "Attach" command.

(5) Disestablish (task force/squadron) OPCON OK

The Query AF command "Disestablish" abolishes a task force/squadron. See "Establish".

(6) Establish...

The Query AF command "Establish" establishes groups of platforms to form a task force and/or squadron. See also "Disestablish".

(7) Include in (task force/squadron (platform) (Finished?)...Yes

The Query AF command "Include" adds one or more specified platforms to an existing task force/squadron. See "Remove".

(8) Remove (from task force/squadron) (platform) (Finished?)...Yes

The Query AF command "Remove" works in opposition to the "Include" command. See "Include".

d. Label and Subdatabase Reference Commands

These commands help the user to enter queries more efficiently by allowing one to refer concisely to a group of platforms and to reduce processing requirements by restricting searches to a small subsection of the whole database.

(1) Drop (label) LABEL OK

The Query AF command "Drop" removes a label from a group of items. See also "Label" and "Use Group".

(2) Label (these) LABEL OK

The Query AF command "Label" assigns a label to a subset of the database. The "Use Group" command allows later reference to this group, reducing processing requirements.

(3) Of (these)

The Query AF command "Of" is the elliptical reference command, which allows the subset of the database defined by a preceding SHOW or FIND command to be used as the database for the next command, thereby minimizing processing and user keystrokes.

(4) Use (as database)...

The Query AF command "Use" allows the user to specify a new file or previously labelled part of a file as the database for further queries.

a. File: Use (as database) File NAME (what is your position?)

b. Group: Use (as database) Group (labelled) LABEL OK

c. Original: Use (as database) Original (file) (What is your position?) LATLONG OK

d. Whole: Use (as database) Whole (file) OK

e. Explicit Database Alteration Commands

These commands allow the user to explicitly create and delete records and groups of records, and to change the content of information fields of existing records.

(1) Add...

The Query AF command "Add" adds new platforms and data to the database. The system prompts for information fields to be explicitly provided by the user. The platforms and data eligible for addition includes:

a. Aircraft
   1. Name
   2. Flag
   3. Class
   4. Category

5. Type
6. Tail Number
7. Position
8. Bearing
9. Speed (km/hr)
10. Combat radius (km)
11. At Airfield

b. Airfield
1. Name
2. Flag
3. Status
4. Position
5. Runway length (in meters)
6. Class

c. Dimensions (to Aircraft, Naval vessel, Missile, Radar)
1. Length (m)
2. Width (m)
3. Depth (m)

d. Missile
1. Name
2. Flag
3. Class
4. Category
5. Type
6. Specific Model
7. Position
8. Bearing
9. Maximum Range (km)
10. Unit Assignment

e. Naval Vessel
1. Name
2. Flag
3. Class
4. Category
5. Type
6. Hull Number
7. Position
8. Bearing
9. Speed (km/hr)
10. Maximum Range (km)
11. Port Location

f. Ports
1. Name
2. Flag
3. Status
4. Position
5. Class

g. Radar
   1. Name
   2. Flag
   3. Class
   4. Category
   5. Type
   6. Model number
   7. Position
   8. Bearing
   9. Maximum Range (km)
   10. Sector Assignment

h. Weaponry (to aircraft or naval vessel)
   1. Gun (number/type mm separated by commas)
   2. Bomb Capacity in Kg
   3. Missile (number/type mm separated by commas)
   4. Rocket (number/type mm separated by commas)

(2) Change...

The Query AF command "Change" changes individual parameters of an individual platform. The user must specify which fields s/he wishes to change. As always, alternatives may be portrayed through the use of "?":

a. Aircraft: Change aircraft NAME (Specify parameter(s) to be changed).

b. Airfield: Change airfield NAME (Specify parameter(s) to be changed).

c. Missile: Change missile NAME (Specify parameter(s) to be changed).

d. Naval vessel: Change naval vessel NAME (Specify parameter(s) to be changed).

e. Port: Change port NAME (Specify parameter(s) to be changed).

f. Radar: Change radar NAME (Specify parameters to be changed).

(3) Delete...

The Query AF command "Delete" removes one or more specified items from the database:

a. Aircraft
b. Airfields
c. Changes (to data...)
d. Classes
e. Diagram (labelled)
f. Group (label)
g. Missile
h. Naval
i. Platforms
j. Ports
k. Radar
l. Synonym
m. Threat (Type)

f. Database Housekeeping Commands

These commands help the user to keep the database tidy and efficient: Housekeeping functions include insuring the internal consistency of the database, incorporating changes into the permanent database (or discarding them), and inverting the database on a specified field, to speed up searches based on this field.

(1) Discard (changes to database) OK

The Query AF command "Discard" restores the database to its state immediately following the last "Update" command.

(2) Invert (database on field) FIELD OK

The Query AF command "Invert" inverts the database on a specified field, minimizing time for future data retrievals based on that field.

(3) Update (database permanently) OK

The Query AF command "Update" incorporates into the permanent database any changes made during the current session (since the last "Update" or "Discard").

(4) Verify

The Query AF command "Verify" allows the database to be verified for data consistency, e.g. the speed of a platform must not exceed the maximum speed.

g. User Interface Modifying Commands

These commands allow the user to tailor some superficial (but not unimportant) properties of the Query AF interface to ones desires.

(1) Alter...

The Query AF command "Alter"

a. Expansion: Alter expansion (of search criteria to) Off/On OK

b. Herald: Alter Herald (to) Long/Short OK

The Query AF command "Alter Herald" allows the user to set the subsystem herald (which appears on the left when the system is ready for a new command) to "QueryA" (long) or simply "Q" (short).

c. Label: Alter Label (display to) Off/On OK

d. Prompting: Alter Prompting (level to) Full/None OK

The Query AF command "Alter Prompting" allows the user to eliminate the NLS indigenous prompts such as:

1. C: indicating that a command is expected.
2. T/A: indicating that text (such as platform name) is expected.
3. OK: indicating that a confirm (return or ⟨CR⟩) is expected.

e. Recognition: Alter Recognition (mode to) Terse/Verbose OK

The Query AF command "Alter Recognition" allows the user to specify whether the system should wait until the characters have been typed before attempting to recognize the command, or merely wait until sufficient characters have been typed to allow

disambiguation. The user should note that if more than one command begins with the same letter, a space character must be typed preceding the first letter of some commands to resolve the ambiguity. Any command preceded by "<>" in the list of possible commands printed by the system in response to a typed ? must have a space typed before the first letter of that command.

f. Search: Alter Search (status to) Off/On OK

g. Trace: Alter Trace (of search to) Off/On OK

(2) Output (these to) Destination OK (Display format?) FORMAT OK

The Query AF command "Output" sends the contents of the database to a file or line printer. This command is vital to the message handling of query results. Once the results of the query have been placed in a file, the user can then enter the normal TENEX system for message handling. By utilizing the "control B" the file can be incorporated into the message. This file may also be FTP (File Transfer Protocol) to other locations.

(3) Print (description of Query AF) OK

The Query AF command "Print" prints a description of the Query AF subsystem at the user's terminal. This is the same description offered to the user when he first enters the Query AF subsystem.

h. Universal Commands Available in All NLS Subsystems

(1) Execute

The universal command "Execute" is not implemented in Query AF and should not be used.

(2) Goto (subsystem) SUBSYSTEM OK

(3) Help

The universal command "Help" is accessed by typing <CTRL-Q> , not "Help".

(4) When In Doubt Type ?

One of the nice features of NLS is that the user may type ? at any point and a list of alternative commands will be presented. Pick from this list, as NLS will not respond to any other alternatives. Note that a ? inserted while inputting text (such as a platform name or type) will be treated as text. If you desire to reconsider a command, type a <CTRL-X> and start over again.

1. TENEX Executive Commands

1. <CTRL-A> deletes the last character (standard TENEX usage).

2. <CTRL-W> deletes the last word (standard TENEX usage).

3. <CTRL-X> deletes the command presently being typed in (standard TENEX usage). Use this command if you are uncertain what you have already entered and are concerned about the consequences.

4. <CTRL-O> stops printout (as in SHOW) (standard TENEX usage).

5. <CTRL-C> a real no no -- this command will lead the user into trouble as it will cause the system to leave NLS and go back into the TENEX EXEC. The character @ will appear as a herald on the beginning of the next line. Please type CONT to get back into NLS. If you desire to exit Query AF, please type the letter q and respond to the subsequent interrogation of "Do you want the database updated permanently?" with NO and then you will be back in NLS.

V. SELECTED DEMONSTRATIONS OF QUERY AF CAPABILITIES

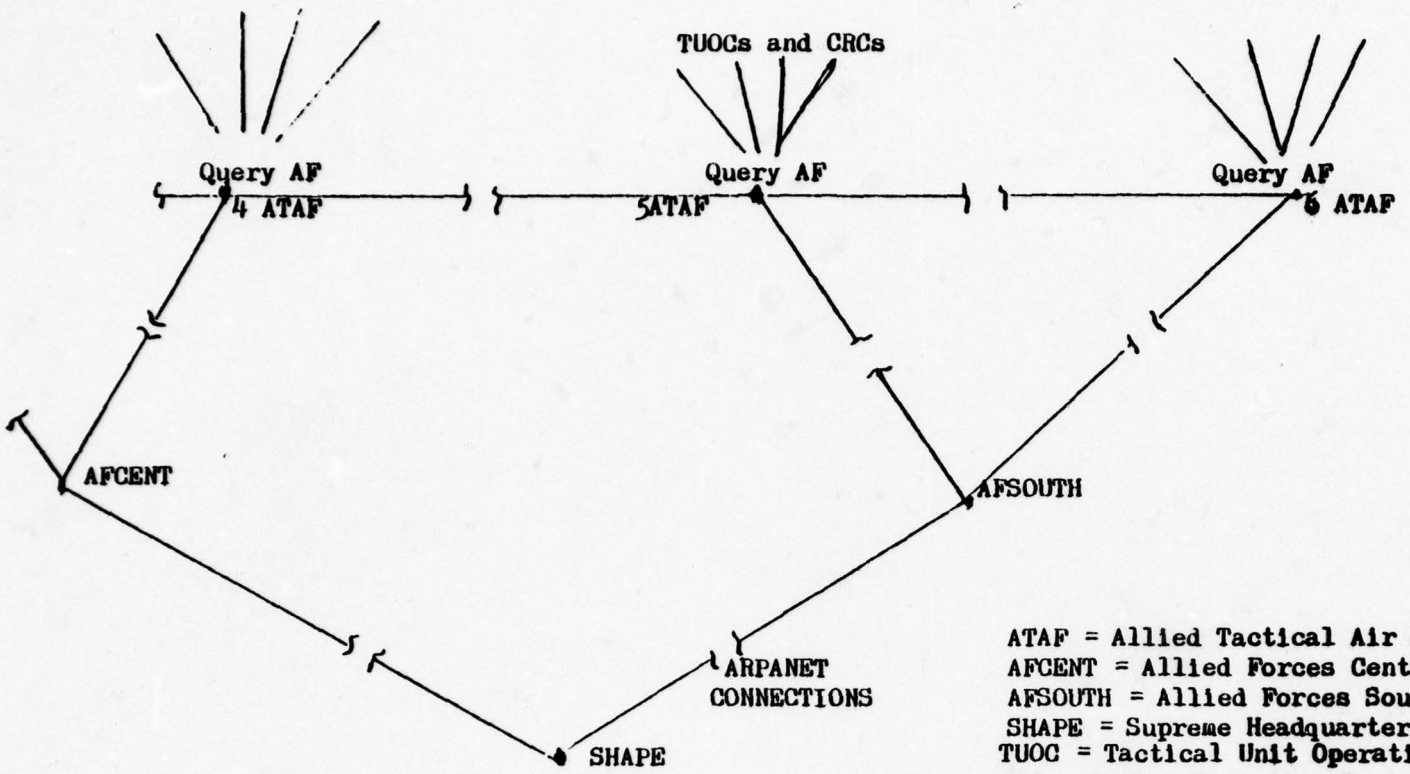
A. QUERY AF FUNCTIONALITY

The Query AF concept was intended to be functionally applicable at the Tactical Air Control Center (TACC) level or Allied Tactical Air Force (ATAF) level within the NATO realm. It is at these levels where automation can contribute significantly to the flow of information, perform intelligence fusion functions, and improve battle management techniques. The lower levels such as the Tactical Unit Operations Center (TUOC) and Combat Reporting Centers (CRP) would be linked to the system and as such be contributors and receivers of pertinent information.

A schematic diagram of a hypothetical NATO system is depicted by Figure 5. Referencing the figure, the ATAF level would have the Query AF operating program supporting their Operational and Estimate intelligence functions. The host computer may or may not be co-located. A single host computer could be located at the AFSOUTH (Allied Forces South) level. ARPANET type connections would be established throughout the system.

Intelligence data inputs could be received from all levels: Higher (AFSOUTH and SHAPE), lateral (6ATAF or 4ATAF) and lower (TUOCs, CRCs, etc.). The Query AF operator would receive and take appropriate action on the messages according to their precedence (see Figure 1).

The Query AF program would significantly expedite the flow of intelligence information and create a more timely picture of



ATAF = Allied Tactical Air Force
AFCENT = Allied Forces Central Region
AFSOUTH = Allied Forces Southern Region
SHAPE = Supreme Headquarters Allied Powers Europe
TUOC = Tactical Unit Operating Center
CRC = Combat Reporting Center

Figure 5 - Hypothetical Diagram of a Functional Use of Query AF

the threat. The larger labor force required to support the previous manual program could be better utilized for other tasks.

The remainder of this chapter serves as a self-guided demonstration of Query AF. The directions assume no prior knowledge of computer techniques; however, it is suggested that the user have available for use or review Chapter IV, part A - Query AF, section 5 - Commands in the Query AF Subsystem, before proceeding.

Please note the following:

1. Throughout the demonstration the ACTUAL alphabetic keys struck are in CAPS and underlined; all numbers are keystrokes, and user inputted carriage returns and spaces denoted by <CR> and <SP> , respectively. <CTRL-key> indicates to hold the control key simultaneously with the striking of the key indicated in the brackets. Computer responses are in quotes "".

2. When in doubt as to what to enter, type ?. A list of alternative commands will be presented. Pick from this list, as the program will not respond to any other alternatives.

3. <CTRL-X> deletes the command presently being typed. Use this command if you are uncertain what you have already entered and are concerned about the consequences.

4. Do not type <CTRL-C> unless instructed. This command will lead the user out of the Query AF program and into TENEX EXEC. If this occurs, the @ sign will appear as a herald on the beginning of the next line. Please type CONT <CR> to get back into Query AF.

5. If at any time you desire to exit, refer to the logout commands. This tutorial assumes that the user of Query AF does

not have the system available locally and must connect his terminal to a remote computer system which has the program available. The connection is made using the telephone, via the ARPANET, to link the user's terminal and the computer. It is further assumed that the special line processor necessary to support the graphics terminal is also not available. With the above in mind, the following directions are restricted to users with a telephone connection to an ARPANET TIP. Instructions to the user are in capital letters throughout the demonstration.

B. TERMINAL CONNECTIONS AND LOGIN COMMANDS

Successful LOGIN cannot be accomplished without prior knowledge of Query AF's protection password. The password can be obtained from Dr. G. K. Poock, Naval Postgraduate School, Monterey, California, or Dr. J. Schill, Naval Ocean System Center, San Diego, California. If you have obtained the password proceed with the following instructions.

PLUG THE POWER CORD OF YOUR TERMINAL INTO A 110 VOLT OUTLET.

SET THE FOLLOWING POSITIONS ON YOUR TERMINAL:

```
Power   : On
Speed   : 30
Mode    : Full (Duplex)
Mode    : Std (Terminal mode)
Parity  : On (Error reset)
Parity  : Even
```

DIAL THE NUMBER FOR THE TIP (TERMINAL INTERFACE PROCESSOR).

LISTEN FOR A HIGH-PITCHED SOUND.

PLACE THE TELEPHONE RECEIVER IN THE RUBBERIZED PORTS OF THE TERMINAL MODEM.

(Note: A busy signal or ringing for more than six times is an unsuccessful attempt at making a connection. Hang up and try again.)
TYPE,

<e>

The TIP should respond with its location. For example, at the Naval Postgraduate School TIP you receive: "NPS TIP 420 #: 1".
TYPE,

@o<SP>116<CR> (remember, the <SP> symbol represents a space.)

The @ is the symbol to tell the ARPANET that a command follows. The o is the command to open a connection to a computer. The 116 is the address of the computer at ISI.

The response of the computer is

"Trying..."

"Open" (This may or may not be followed by a series of messages to the general user regarding the status of the system.)

"@" (The @ sign indicates the computer is ready for the next command.)

TYPE,

LOG<SP>QUERYAF<ESC>"(password)"<ESC>"(account)"<CR>

(Note: The user must provide the protection password.)

The computer response will be the awarding of a job number. For example - "JOB 27 on TTY140 8-Mar-79 21:34". The "@" sign will also appear as the herald to the next line after the job printout.

TYPE,

NLS<CR> (This will enter you into the NLS system)

The printout will be "Ident ="

TYPE,

QAF<CR>

The computer will now go through a series of responses designed to pull in the necessary programs to run Query AF. No response is required to these returns so just watch. Eventually the printout will ask if you would like a description of Query AF. This question must be responded to with a y for yes or n for no. A yes will provide a lengthy description of Query AF and then return you to the same point had you typed no.

TYPE,

N"o"<CR>

The computer will now ask,

"(What is your position? (Default is Naples)) T/[A]:" Your response to this should be a <CR>. This will automatically set your position in Naples, the Headquarters for the Air Force of the Southern Region of Europe. As one becomes more proficient, an individually selected set of coordinates may be used instead of the <CR>.

TYPE,

<CR> The system response shcould be,

"Query, DatabaseAF.NLS;22"

"QUERYA C:" This indicates you are now logged into Query AF and ready to start querying the database. Note: "QueryA C:" should appear as the herald for the start of each new command. Should you ever receive the "@" herald, you have inadvertently

gone back into the TENEX EXEC and must type CONT⟨ESC⟩⟨CR⟩ to get back into the Query AF program.

SUMMARY OF TYPING INSTRUCTIONS TO ACHIEVE LOGIN

⟨e⟩

"NPS TIP 420 #:1"

@o⟨SP⟩116⟨CR⟩

"Trying..."

"Open"

"General system messages..."

"@"LOG⟨SP⟩QUERYAF⟨ESC⟩"(PASSWORD)"⟨ESC⟩"(ACCOUNT)"⟨CR⟩

"JOB ## on TTY140 #-DATE-79 Time"

NLS⟨CR⟩

"IDENT="QAF⟨CR⟩

"BASE C: Simulate (Terminal Type) C: Ti (Terminal) OK:"

"BASE C: Goto (subsystem) C: Programs OK:"

"PROG C: Delete C: All (programs in buffer) OK:"

"PROG C: Load C: Program T/[A]: load3"

"Loading User Program"

"Don't Execute via RUN PROGRAM CommandUSE GOTO SUBSYSTEM Command"

"Loading User Program"

"Subsystem LOAD3 Now Available (Attached)"

"PROG C: Quit OK/C:"

"BASE C: Load C: Novice (QueryAF) OK:"

"This is Version #.# of Query dated ##-date-79."

"(Do you want a Description of QueryAF?) C:" N "OK:"⟨CR⟩

"(What is your position? (Default is Naples)) T/[A]:"⟨CR⟩

"Query, DatabaseAF.NLS;22"

"QUERYA C:" Now you are ready to start querying the database.

C. BASIC COMMAND FEATURES

Before initiating commands it will be beneficial to the user to review some basic features of Query AF.

1. TREE Structure:

Query AF and NLS both operate on somewhat of a tree type structure. This enables the user to obtain a large amount of general information from the top of the tree and more specific information by moving down through the tree. To stop the flow of output at any time, simply type <CTRL-O> (this is the control key and O key simultaneously). Also note <CTRL-X> aborts a command.

Note once again, CAPS and underlining indicates the user's input and the quotes the program's output.

For an example of large amounts of general data from the top of the tree and to demonstrate the stop command,

TYPE,

F"ind (all) C;"A"irfields (with) C:"F"lag C:"E"qual (to) T/[A]:"HU<CR>
"OK/C:"<CR>
"(Display format?) C:"S"hort OK:"<CR>

The response will be a listing of all Hungarian airfields. To stop,

TYPE,

<CTRL-O>

For an example of the abort command,

TYPE,

S"how C:"<SP>AL "1 (platforms) OK/C:" <CTRL-X>
"QueryA C:" returned to start the next command.

For an example of specific information extraction from the lower levels of the tree,

TYPE,

F"ind (all) C:"⟨SP⟩A"ircraft (with) C:"F"lag C:"E"qual (to) T/[A]:"UR⟨CR⟩

"OK/C:"A"nd C:"C"lass C:"E"qual (to) T/[A]:"Farmer C ⟨CR⟩

"OK/C:"A"nd C:"W"ithin T/[A]:"500⟨CR⟩

"C:"K"ilometers (of) C:"M"e OK/C:" ⟨CR⟩

"(Display format?) C:"S"hort OK:" ⟨CR⟩

Response will be a listing of those aircraft, in the database, satisfying the requested criteria.

2. Structured Commands and Prompting

The Query AF commands approach that of a structured subset of English. Each command is also prompted so the user will always be certain of what inputs the computer required next. Review the commands in part one in light of the following:

C: indicates that a command is expected.
T/[A]: indicates that text (such as platform name) is expected.
OK: indicates that a confirm (return or ⟨CR⟩) is expected.
OK/C: indicates a confirm or additional command is expected.

If at any time the user is uncertain of the options available, s/he simply types ?. A list of current alternatives will be presented. Pick from this list, as the program will not respond to any other alternatives.

For example,

TYPE,

F"ind (all) C:"?

A list of current alternatives for platforms will be printed.

TYPE,

⟨CTRL-X⟩

TYPE,

"QueryA C:"S"how C:" ?

A list of current alternatives for the Show command are printed.

TYPE,

⟨CTRL-X⟩

Since both FIND and SHOW are the most widely used commands, it may be beneficial to extract and save the current list of alternatives until one is more proficient.

Note: within the Query AF program, <> indicates a space is required. Any command preceded by <> in the list of possible commands printed by the system in response to a typed ? must have a space typed before the first letter of that command.

Query AF provides a variety of display formats. This enables the user to select the degree of detail for the output. Current alternatives include:

Tabular - Only the platforms NAME

Short --- NAME, TYPE, FLAG, POSITION

Medium -- All of the above with the rest of the platforms dynamic characteristics such as unit assignment

Long ---- All of the above plus its class characteristics such as weaponry, size, etc.

Summary - Provides total number of elements by TYPE

Graphical - You must have a line processor for graphics. Not possible for this demonstration

For example,

TYPE,

S"how C:"P"latform T/[A]:"Kiev⟨CR⟩

"(Display format?) C:" ?

"Current Alternatives are:

Graphical	None	Summary
Long	Short	CTRL-Q : HELP
Medium	Tabular	CTRL-S : SYNTAX"

TYPE,

L"ong OK:" <CR>

The printout will be the long format. If you like, repeat the same command but with a different display format.

D. USER'S POSITION

The WHERE and MY commands report or modify the user's position. This position is used as the reference for database commands such as "show all aircraft within 200 kilometers of me".

TYPE,

W"here (am I?) OK:"<CR>

"You are at 4053N01417E in the ATLANTIC:Database is file <QUERYAF>Database#.NLS.#."

Now that you know where you are, change your position by typing,

M"y (position is) T/[A]:"4602N01236E<CR>

"You are at 4602N01236E in the MEDITERRANEAN:Database is file <QUERY>DatabaseAF.NLS.#."

E. MOVEMENT OF PLATFORMS

The PUT command enables the user to place a dynamic element such as a naval vessel or aircraft at a specific port or airfield and change the element's position explicitly without requiring the user to look up the position of the destination.

TYPE,

<SP>PU"t (Type of craft)C:"A"ircraft T/[A]:"FISHBED<SP>J<CR>

"(at)C:"A"irfield T/[A]:" PAPA<CR>

"Several craft with NAME = FISHBED J."

```
"1  NAME=FISHBED J.........AT AIRFIELD SARMELLEK....FLAG=HU....
 2  NAME=FISHBED J.........AT AIRFIELD SARMELLEK....FLAG=HU....
 3  NAME=FISHBED J.........AT AIRFIELD TASZAR....FLAG=UR...."
```

"Enter number of desired record:" 2 "OK"

F. ADDITION OF NEW DATA

The ADD command enables the addition of more platforms to the database.

TYPE,

A"dd C:"<SP>A"ircraft

"(Field(s) may be specified as unknown -- UNK)"

"(Name=) T/[A]:" FLOGGER<CR>

"(Flag--e.g., US=) T/[A]:"UR<CR>

"(Class=) T/[A]:" FLOGGER<SP>D<CR>

"(Category=) C:" <SP>FI"ghter-Bomber OK:" <CR>

"(Type--e.g., FDA=) T/[A]:" FGD<CR>

"(Tail number=) T/[A]:" UNK<CR>

"(Position=) T/[A]:" 4722N01732E<CR>

"(Bearing=) T/[A]:" 000<CR>

"(Speed=Km/Hrs) T/[A]:" 000<CR>

"(Combat radius(Km)=) T/[A]:" 1125<CR>

"(Airfield Location=) T/[A]:" PAPA<CR>

"QUERYA C:" ready for next command

The ADD command can also add dimensions/weaponry to a class.

TYPE,

A"dd C:"D"imensions (to class) T/[A]:" FLOGGER⟨SP⟩D⟨CR⟩

"(Field(s) may be specified as unknown--UNK)"

"(Length(meters)=) T/[A]:" 18.3⟨CR⟩

"(Width=) T/[A]:" 14.6⟨CR⟩

"(Depth=) T/[A]:" UNK⟨CR⟩

"QUERYA C:" ready for next command

TYPE,

A"dd C:"W"eaponry (to) C:"A"ircraft (class) T/[A]:" FLOGGER⟨SP⟩D⟨CR⟩

"(Guns:number/type mm separated by commas=) T/[A]:" 0⟨CR⟩

"(Bombs:capacity in kilograms) T/[A]:" 1300⟨CR⟩

"(Missiles:number/class list separated by commas=) T/[A]:" 0⟨CR⟩

"(Rockets:number/size list separated by commas=) T/[A]:" 0⟨CR⟩

"QUERYA C:" ready for next command

G. DELETION OF DATA

The DELETE command enables the user to eliminate unneeded records or elements.

TYPE,

D"elete C:"P"latforms T/[A]:" FLOGGER⟨SP⟩D⟨CR⟩

"(Finished?) C:"Y"es OK:" ⟨CR⟩

"QUERYA C:" ready for next command

H. LABEL HIGH INTEREST ITEMS

If the user finds s/he is constantly referring to specific records, s/he can specify a label for the subset of the database

s/he is interested in. The user can then utilize the USE command to operate only on this subset with Query AF commands.

TYPE,

F"ind (all) C:"<SP>A"ircraft (with) C:"<SP>W"ithin T/[A]:" 500<CR>

K"ilometer (of) C:"M"e OK/C:" <CR>

"(Display format?) C:"S"hort OK:" <CR>

A listing of all aircraft in this category will appear.

"QUERYA C:"L"abel C:"T"hese T/[A]:" IMMEDIATE<SP>THREAT<CR>

"QUERYA C:" ready for next command

The USE command can now be utilized to query just this subset of the database. This saves search time.

TYPE,

U"se (as database) C:"G"roup (labelled) T/[A]:" IMMEDIATE<SP>THREAT<CR>

"You are at 4445N01430E in the MEDITERRANEAN; Database is IMMEDIATE THREAT portion of file <QUERY> DATABASEAF.NLS;#,which has been modified since last update or delete changes."

"QUERYA C:" ready to ask specific questions to this subset of the database.

TYPE,

F"ind (all) C:"<SP>A"ircraft (with) C:"<SP>NA"me C:"E"qual (to) T/[A]:" FITTER<CR>

"OK/C:" <CR>

"(Display format?) C:"M"edium OK:" <CR>

A listing of all aircraft in this category will be printed. Now to return to the original database.

TYPE,

U"se (as database) C:"O"riginal (file) OK:" <CR>

"(What is your position?) T/[A] :" <CR>

"You are at 4445N01430E in the MEDITERRANEAN; Database is file <QUERY> DATABASEAF.NLS;#,which has been modified since last update or delete changes."

"QUERYA C:" you have returned to the main database and are ready to initiate queries against the main database. If the user wishes, at a later time, to again query the immediate threat database, s/he merely initiates the USE command.

I. SYNONYMS

A synonym capability is available through the ASSIGN command.

TYPE,

<SP>ASSIG"n C:"S"ynonym T/[A] :" MIG-21<CR>

"(to) C:"P"latform T/[A] :" FISHBED<CR>

"QUERYA C:" ready for the next command

Mig-21 and FISHBED are now synonymic.

J. THREAT ASSESSMENT

For the purpose of this demonstration, the following countries are considered belligerent: Soviet Union, Yugoslavia, Libya, Bulgaria, Romania, and Czechoslovakia.

TYPE,

S"how C:"<SP> THR"eat (to) C:"<SP>A"ircraft (kind of threat:) C:"I"nterceptor

"(Threats to aircraft) T/[A] :" PHANTOM<CR>

"(Display format?) C:"S"hort OK:" <CR>

A list will appear of all interceptor aircraft considered to be a threat to the Phantom, based on the Phantom's present position. The user has the option to move the Phantom to another location (PUT command) and recheck the interceptor threat.

To demonstrate the various threats against an airfield, TYPE,

S"how C:"⟨SP⟩THR"eat (to) C:"A"irfield (Kind of threat:) C:"C"onventional (air attack threats to airfield) T/[A]:" AVIANO⟨CR⟩
"(Display format?) C:"S"hort OK:" ⟨CR⟩

A list of the conventional threat to Aviano will print.

TYPE,

S"how C:"⟨SP⟩THR"eat (to) C:"A"irfield (Kind of threat:) C:"N"uclear (air attack threats to airfield) T/[A]:" AVIANO⟨CR⟩
"(Display format?) C:"S"hort OK:" ⟨CR⟩

A list of the nuclear threat to Aviano will print.

TYPE,

S"how C:"⟨SP⟩THR"eat (to) C:"A"irfield (Kind of threat:) C:"S"urface (to surface nuc/con threats to airfield) T/[A]:" AVIANO⟨CR⟩
"(Display format?) C:"S"hort OK:" ⟨CR⟩

A list of the nuclear and conventional surface to surface threat to Aviano will print.

K. MESSAGE PREPARATION AND TRANSMISSION

Pertinent data can be extracted from the database, placed in a separate file, then disseminated to higher, lateral, and subordinate commands in message form. To demonstrate this concept, TYPE,

S"how C:"<SP>THR"eat (to) C:"A"irfield (Kind of threat:) C:
"C"onventional (air attack threats to airfield) T/[A]:" AVIANO<CR>
"(Display format?) C:"S"hort OK:" <CR>
The air threat to Aviano will print out followed by,
"QUERYA C:" indicating the system is ready for the next command.
TYPE,
<SP>O"utput C:"T"hese (to) C:"F"ile T/[A]:" THREAT<CR>
"(Display format?) C:"S"hort OK:" <CR>
"QUERYA C:" the above data is now located in a file titled threat,
and the system is ready for the next command. In order to send
the threat data, the user must exit the Query AF program and
enter the TENEX message program. Tc accomplish this,
TYPE,
G"oto (subsystem) C:"T"enex OK:" <CR>
"@" MSG<CR>
You are now in the message program of TENEX. To send the message,
TYPE,
S"ndmsg Confirm " <CR>
" control-N aborts back to MSG "
"To (? for help):"(the user should type in the action addressees
then)<CR>
"cc (? for help):"(the user should type in the information
addressees then)<CR>
"Subject:" THREAT<CR>
"Message (? for help):"
THE CURRENT THREAT TO AVIANO AIR FIELD IS:<CR>

<CTRL-B> <CR>

"(insert file or invoke TECO (F, T, OR ?)?"F")"

"(insert file;" THREAT.TXT<CR> (the file has now been brought into the message)

"...EOF)" <CR>

(the user now has the option to add more text if s/he wishes. When finished,)

TYPE,

<CTRL-Z> "Z"

"Q,S,?,carriage-return:" <CR>

The system will respond to the <CR> by printing all the addressees and an OK if the message was disseminated. The system will also automatically list that you have new messages. This process appears in the following manner.

"Addressees--OK"

"you have new messages"

" ## Date TO: Addressees Subject (# of characters in Msg)"

"Current message is ## of ## messages"

If the user wishes to review the message,

TYPE,

T"ype "##(the number of the respective message)<CR>

The entire message will print out. Note the message was automatically given a date time group. Since the user is still in TENEX message, s/he must perform the following commands to return to the Query AF program.

TYPE,

<CTRL-C>

"@"POP⟨CR⟩

"QUERYA C:" ready to initiate another command or terminate (LOGOUT).

L. VIDEO DISPLAYS

Video displays are not possible with this demonstration due to the lack of a line processor. However, for the readers' convenience, figure 6 and 7 have been developed to illustrate what the user would have visualized had graphics been incorporated as part of the demonstration.

Figure 6 commands are:

Show C: All (platforms) OK/C: Within ((# of Km or Hrs)) T/[A]: 200 ⟨CR⟩ C: Kilometers (of) C: Platform T/[A]: Ranger ⟨CR⟩ (Display format?) C: Graphics⟨CR⟩C: Short OK: ⟨CR⟩

Figure 7 commands are:

Show C: Task (force) T/[A]: TF77⟨CR⟩

(Display format?) C: Graphical C: Short⟨CR⟩

M. QUIT AND LOGOUT

In order to properly quit the Query AF program and LOGOUT, TYPE,

Q"uit OK/C:"⟨CR⟩

"(Do you want to update the data base permanently?) C:"N"o OK:"⟨CR⟩

"Load C:"Q"uit OK/C:"⟨CR⟩

"Base C:"Q"uit OK/C:"⟨CR⟩

"@" LOGOUT⟨CR⟩

"Killed Job #, user Query AF, Account ACCAT, TTY #, At date"

"Used #'s"

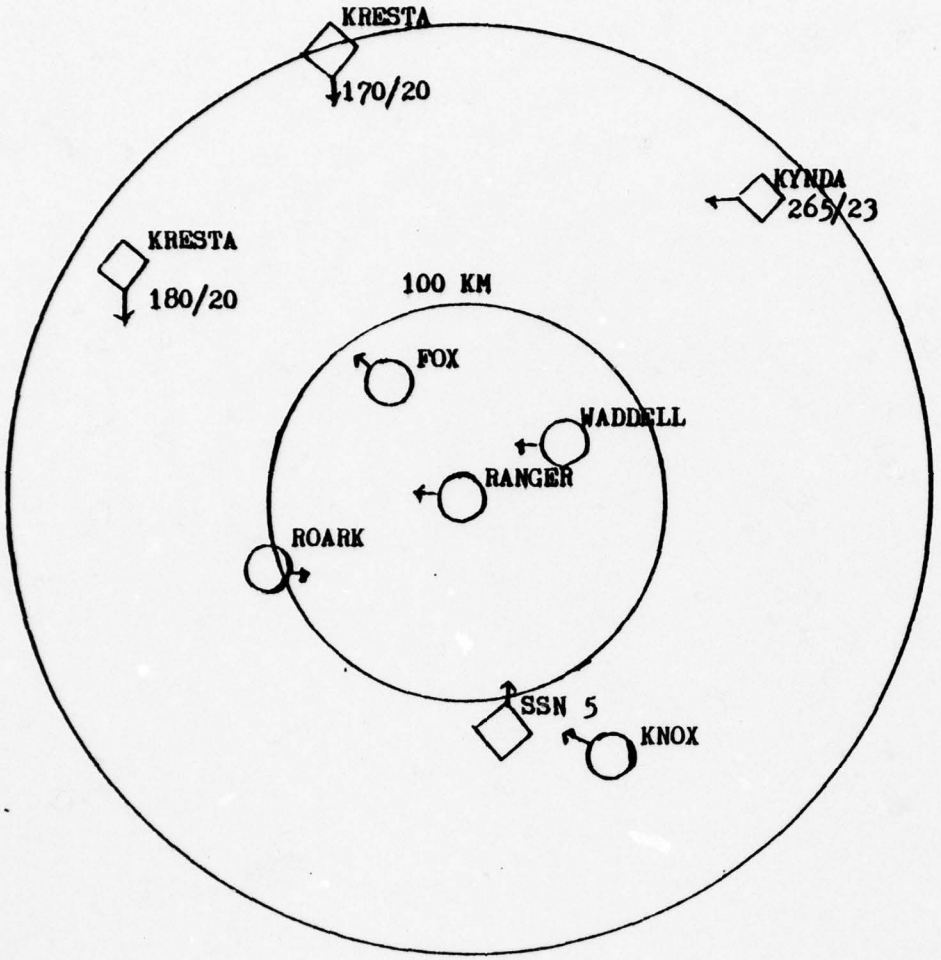


Figure 6 - Show all platforms within 200 kilometers of Ranger

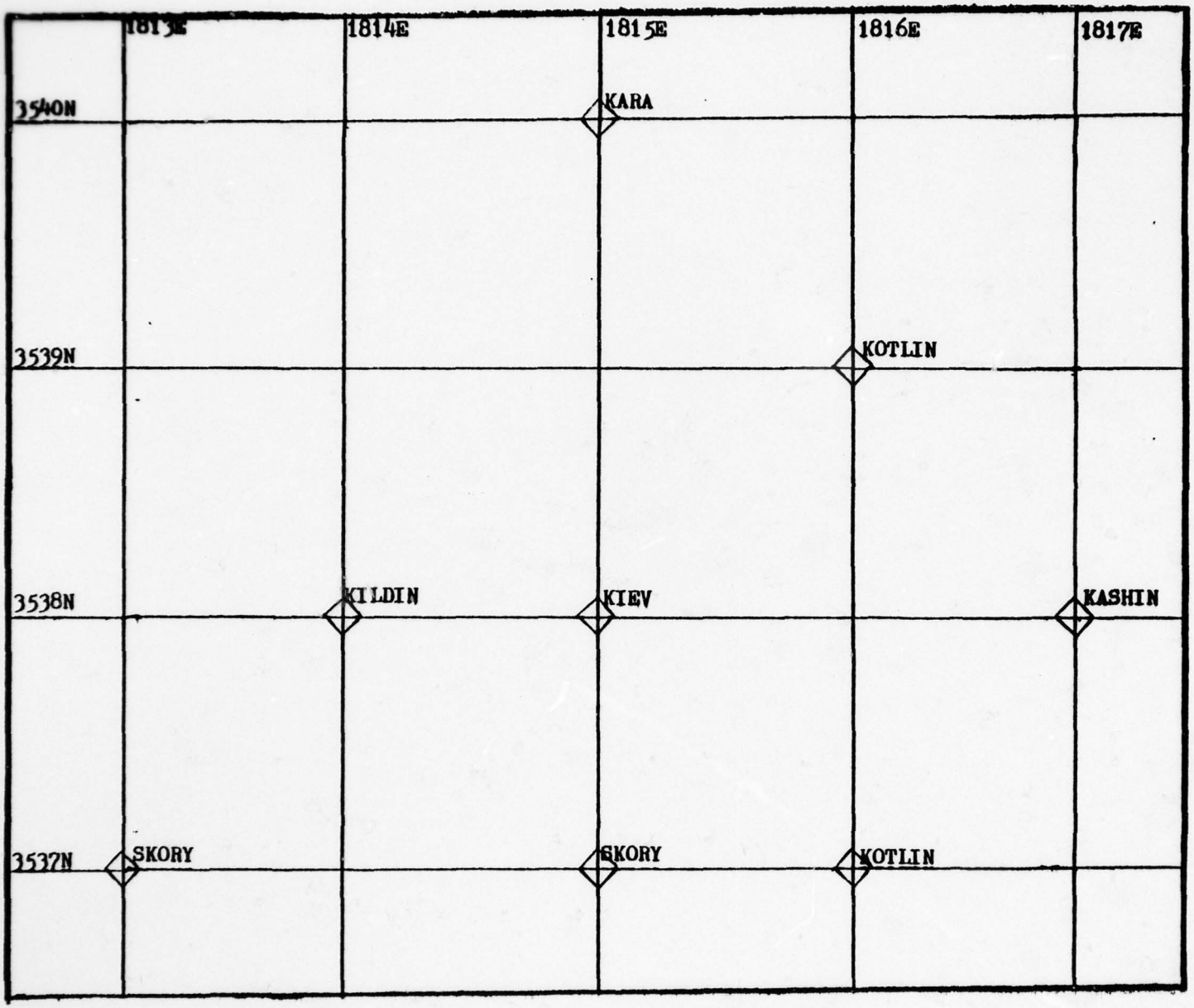


Figure 7 - Show Task Force TF77

@C<CR>

"Closed"

You have now terminated all computer operations. Disconnect the phone from the terminal and hang up the receiver. Turn off the terminal.

VI. SUMMARY AND EXTENSIONS

Today, computer technology is permitting low cost access to models, systems, and databases through the use of interactive terminals. As these facilities gain flexibility and power, they open up new opportunities to emulate real systems quickly, economically, and yet robust enough to give good "feel". Query AF represents such an emulation. It was developed over a short period of time and at relatively low cost. The program however adequately demonstrates an application of the state-of-the-art in computer technology to a specific problem identified within the tactical air force intelligence field. It should be reiterated that the demonstration was not to represent the optimum utilization of the hardware and software presented.

Query AF, through NLS, emphasizes the human interface capabilities with a structured database. The database was representative of those Warsaw Pact forces envisioned to oppose the United States Air Force and our North Atlantic Treaty Organization Allies within the Southern Region of Europe.

A scenario of database inquiry (query) and management was chosen from the tactical air force command and control environment. The format for the commands approached that of a structured subset of English to simulate the natural use of English in the Air Force intelligence context. Through the use of prompting, rapid data manipulation and assessments were demonstrated against the specially developed Warsaw Pact database. The

program, as demonstrated, has applicability at the Tactical Air Control Center level or the Allied Tactical Air Force level within the European Theater.

Query AF integrated with the ARPANET further demonstrates a new concept in the transmission of information. Such systems highlight the feasibility of computer to computer transmission of data and the accessing of data from remote sites.

Query AF as demonstrated was primarily directed towards the capability to rapidly present, update, assess, and disseminate the air threat. As such, many of the records and data inputs are narrow in scope. It should be pointed out that through NLS, addition of new records and modifications of existing records can be accomplished. Within this context, other applications of this type of program are foreseen in the areas of target intelligence and force status.

APPENDIX A

PORTS

The port database centers around Italy and includes ports from adjacent Mediterranean littoral countries. Listings of major naval bases in the appropriate countries were extracted from the Almanac of World Military Power [19]. Geographic coordinates were obtained from Jet Navigation Maps and the Encyclopedia Britannica. Depicted data includes:

A. Algeria:

Algiers	3649N00310E
Arzew	3552N00017W
Bone	3652N00745E
Mers-el-Kebir	3543N00039W
Oran	3542N00038W
Philippeville	3658N00650E

B. Albania:

Sazan	4029NC1917E

C. France:

Brest	4824N00430W
Cherbourg	4922N00136W
Lorient	4744N00325W
Toulon	4338N00557E

D. Greece

Mitilini	3907N02634E
Piraievs	3754N02345E
Salonika	4039N02259E

E. Italy

Ancona	4336N01330E
Augusta	3713N01513E
Brindisi	4038N01757E
Genoa	4425N00855E
Leghorn	4332N01020E

Naples	4050N01420E
La Spezia	4407N00948E
Taranto	4027N01715E
Venice	4528N01215E

F. Libya:

Benghazi	3206N02005E
Darnah	3044N02238E
Marsa al Buraygah	3014N01909E
Tobruk	3205N02358E
Tripoli	3252N01312E

G. Spain:

Cartagena	3735N00100W
Mallorca	3934N00240E
Rota	3632N00615W

H. Tunisia:

Bizerte	3716N01057E
Tunis	3648N01010E

I. Yugoslavia:

Dubrovnik	4239N01805E
Kotor	4225N01847E
Pula	4452N01351E
Sibenik	4343N01555E
Split	4329N01626E
Zadar	4307N01514E

APPENDIX B

AIRFIELDS

The airfield database focuses on the NATO country Italy, located in the Southern Region of NATO. Warsaw Pact countries represented include Bulgaria, Czechoslovakia, Hungary, Romania and selected portions of the Soviet Union. In addition, the countries of Albania, Algeria, Libya, Tunisia, and Yugoslavia have been included. Depicted data includes:

A. Albania:

Cerrik	4102N02000E
Korce Northwest	4008N02044E
Kukes	4202N02026E
Shtoj I Ri	4206N01932E
Stalin	4046N01954E
Tirane	4119N01947E
Tirane Rinas	4124N01943E
Vlore	4028N01928E

B. Algeria:

Algiers	3643N00312E
Ain Ousera	3531N00254E
Annaba	3640N00749E
Batna	3532N00610E
Bejaia	3642N00504E
Bejaia Ville	3644N00503E
Blida	3631N00250E
Biskra	3448N00545E
Boufarik	3633N00254E
Bousaada	3520N00412E
Bousfer	3543N00048W
Constantine	3616N00617E
El Abiod	3255N00033E
El Bayadh Center	3340N00103E
El Qued	3329N00642E
Ghriss	3512N00010E
Guelma	3626N00730E
Ighil Izane	3545N00038E
Jijel	3648N00548E
Khenchela	3524N00710E

Laghouat	3346N00252E
La Reghaia	3644N00323E
Metlili	3222N00348E
Oran	3537N00036W
Orleansville	3612N00120E
Saida	3455N00010E
Setif	3610N00520E
Sidi Bel-Abbes	3511N00035W
Skikda	3651N00658E
Tafaraoui	3532N00031W
Tebessa	3524N00808E
Telergma	3606N00621E
Tiaret	3519N00124E
Tlemcen	3501N00128W
Touggourt	3304N00605E

C. Bulgaria:

Balchik	4324N02811E
Bezmer	4228N02620E
Bukhovtsi	4319N02641E
Burgas	4234N02730E
Byala Slatina	4327N02353E
Cheshnegirovo	4208N02500E
Dolna Mitropoliya	4328N02432E
Dolni Rakovets	4227N02200E
Gabrovnitsa	4333N02318E
Gorna	4310N02538E
Gotse Delchev	4133N02347E
Graf Ignatievo	4218N02443E
Kamenets	4340N02501E
Kumaritsa	4248N02318E
Malevo	4152N02537E
Mikhaylovgrad	4321N02315E
Ravnets	4231N02715E
Shtruklovo	4341N02603E
Sliven	4238N02620E
Stanke	4220N02315E
Stara Zagora	4223N02540E
Tenevo	4221N02635E
Tolbukhin	4337N02752E
Topoli	4314N02750E
Uzundzhovo	4159N02537E
Vidin	4402N02248E
Vrazhdebna	4244N02323E
Zimnitsa	4236N02639E

D. Czechoslovakia:

Barca	4809N02115E
Bechyne	4916N01430E
Cesk Budejovice	4858N01425E
Cheb	5005N01225E

Chotusice	4956N01542E
Dlouha Lhota	4942N01405E
Dobrany	4939N01315E
Horvice	4950N01357E
Hrader Kralove	5014N01550E
Ivanka Pri Dunaji	4809N01713E
Karlovy	5012N01254E
Kbely	5007N01433E
Kunovice	4901N01726E
Malacky	4823N01708E
Milovice	5014N01455E
Mimon	5038N01445E
Mosnov	4940N01806E
Namest Nad Oslavou	4909N01606E
Panensky Tynec	5018N01355E
Pardubice	5000N01545E
Piestany	4837N01750E
Poprad Tatry	4904N02015E
Prerov	4925N01725E
Ruzyne	5005N01415E
Sliac	4838N01907E
Tchorovice	4924N01347E
Trencin	4850N01800E
Turany	4909N01645E
Vezna	4925N01500E
Vodochody	5012N01424E
Vsechov	4927N01437E
Zabreh	5000N01808E
Zatec	5021N01335E

E. Hungary:

Brettyoujfalu	4714N02129E
Debrecen	4729N02137E
Ferihegy	4726N01914E
Fokto	4604N01857E
Gyor	4731N01743E
Kecskemet	4655N01944E
Janoshalma	4616N01920E
Kiskunlachaza	4711N01904E
Kunmadaras	4724N02047E
Mezokovesd	4748N02038E
Papa	4722N01732E
Pecs South	4559N01814E
Rakoczifalva	4706N02014E
Sarmellek	4640N01708E
Szombathely	4716N01638E
Tapioszentmarton	4717N01947E
Taszar	4623N01755E
Tokol	4720N01858E
Veszprem	4704N01758E

F. Italy:

Alghero	4036N00817E
Ancona	4336N01320E
Aviano	4602N01236E
Bari	4108N01647E
Bergamo	4540N00942E
Bologna	4432N01117E
Brindisi	4039N01757E
Cameri	4532N00840E
Catania	3728N01504E
Ciampino	4148N01235E
Comiso	3700N01436E
Cortina Dampezzo	4635N01207E
Crotone	3859N01705E
Decimomannu	3921N00859E
Firenze	4348N01112E
Foggia	4124N01545E
Forli North	4412N01220E
Forli South	4411N01205E
Gagliari	3915N00904E
Galatina	4015N01808E
Ghedi	4526N01016E
Gioia Del Colle	4046N01656E
Grazzanise	4104N01405E
Grosseto	4246N01104E
Istrana	4541N01206E
Latina	4139N01317E
Linate	4527N00916E
Malpensa	4536N00845E
Montichiari	4525N01020E
Naples	4053N01417E
Olbia	4052N00931E
Palermo	3811N01307E
Pescara	4337N01320E
Piacenza	4454N00943E
Pisa	4341N01024E
Reggio Calabria	3805N01540E
Rimini	4401N01237E
Rivolta	4559N01303E
Ronchi Del Legionar	4549N01329E
San Rancrazio	4028N01752E
Sigonella	3724N01455E
Taranto	4030N01725E
Torino	4512N00740E
Trapani	3755N01228E
Treviso	4539N01212E
Venice	4529N01220E
Vicenza	4534N01132E
Villafranca	4524N01053E

G. Libya:

Al Adam	3151N02355E
Benina	3206N02018E
El Uotia	3228N01154E
Kunbuth	3151N02436E
Labraq	3248N02159E
Lete	3206N02014E
Misurata West	3220N01505E
Okba Ibn Nafia	3250N01318E
Tripoli	3240N01310E

H. Romania:

Alexeni	4442N02643E
Balaci	4424N02500E
Baneasa	4430N02607E
Boteni	4438N02537E
Caracal New	4407N02426E
Caransebes	4526N02215E
Ceala	4611N02116E
Cocargeaua	4424N02744E
Craiova	4420N02355E
Focsani South	4540N02713E
Ianca	4509N02726E
Iasi North	4711N02739E
Luizi Calugara	4632N02655E
Luna	4630N02354E
Mihail Kogalnicernu	4422N02829E
Oradea	4701N02155E
Otopeni	4434N02606E
Salcea	4741N02620E
Someseni	4648N02343E
Tautii Magherus	4740N02329E
Timisoara Northeast	4549N02120E
Turnisor	4547N02406E
Vidrasau	4628N02425E
Zilisteanca	4514N02700E

I. Tunisia:

Bizerte	3713N00947E
Djedida	3654N00956E
Gabes	3352N01047E
Gafas	3423N00851E
Monstir	3544N01045E
Sam In Jah	3624N01002E
Sfax	3442N01042E
Soliman	3642N01027E
Tunis	3650N01015E

J. USSR:

Balovnoye	4703N03155E
Belaya	4949N03001E
Belhek	4442N03335E
Berdichev	4953N02833E
Blagoyevo	4654N03042E
Borodyanka	5041N02957E
Broniki	5032N02750E
Chepelevka	4949N03035E
Chernovtsy Northwest	4824N02542E
Chervonoarmeysk Northeast	5010N02520E
Chervono Glinskoye	4556N02923E
Dubno Northeast	5027N02552E
Dzhankoy	4532N03426E
Genichesk	4612N03447E
Gnoync	5055N02428E
Gorodnya	5154N03140E
Gorodok	4944N02342E
Gusakova	4640N03233E
Gvardeyskoye	4507N03400E
Ivano-Frankovsk	4853N02444E
Kacha	4447N03335E
Kalinovka	4930N02835E
Kanatovo	4834N03225E
Kaukhovka	4707N03047E
Khersones	4435N03325E
Khmel Nitskiy	4940N02702E
Kiev Borispol	5022N03057E
Kiev Svyatoshine	5029N03025E
Kiev Zhulyany	5024N03033E
Kirovograd	4832N03218E
Kishinev	4656N02856E
Kolomyya	4832N02509E
Korosten	5059N02839E
Krasilov	4940N02655E
Krivoy Rog East	4752N03334E
Kulbakino	4656N03207E
Lebedin	5034N03431E
Limanskoye	4640N03001E
Lutsk North	5047N02521E
Lvov Sknilov	4949N02358E
Lyubsha	4918N02413E
Markuleshty	4752N02815E
Mirgorod	4956N03340E
Ochakov	4640N03135E
Odessa Central	4607N03041E
Oktyabrskoye	4520N03408E
Ozero Donuzlav	4520N03304E
Palmira	4946N03209E
Peski	5022N03334E
Piryatin	5010N03233E
Poltava	4938N03429E
Popelnya	4957N02925E

Priluki	5035N03220E
Rotmistrovka	4908N03142E
Saki	4505N03336E
Sambor	4932N02320E
Simferopol	4455N03405E
Simferopol North	4503N03359E
Skomorokhi	5011N02845E
Sovetskiy	4522N03456E
Staro Konstantinov	4945N02718E
Stryy	4915N02350E
Ternopol	4931N02543E
Tiraspol	4653N02937E
Uman	4848N03015E
Vasilkov	5015N03020E
Veseloye	4536N03417E
Voronkovo	4741N02906E
Voznesensk	4732N03117E
Yevpatoriya	4514N03323E
Zolochev	4950N02445E

K. Yugoslavia:

Belgrade	4449N02019E
Bihac	4450N01548E
Cerklje	4554N01532E
Dubrovnik	4234N01817E
Kovin	4447N02058E
Ljubljana	4613N01427E
Mostar	4316N01751E
Nis	4320N02151E
Obrva	4349N02036E
Ohrid	4112N02045E
Pristina	4234N02102E
Pula	4453N01355E
Rijeka	4521N01429E
Rijeka Krk	4512N01434E
Sarajevo	4349N01821E
Skopje	4157N02138E
Sombar	4542N01905E
Split	4332N01619E
Titograd	4221N01919E
Tivat	4224N01843E
Tuzla	4426N01844E
Virsac	4509N02120E
Zadar	4406N01521E
Zagreb	4545N01605E
Zaluzani	4509N02120E

APPENDIX C

AIRCRAFT, NAVAL VESSELS, RADARS, MISSILES

The database within this area represents examples of the Warsaw Pact forces and other potential forces envisioned to possibly oppose the United States Air Force and our NATO allies within the Southern Region of Europe. All facts and figures are unclassified; as such, they do not necessarily represent the absolute characteristic or performance capability of the respective platform. Support data and facts were extracted from and represent a composite picture from the following sources: Janes All The World Aircraft, Janes Weapon Systems, Janes Fighting Ships, Gallery of Soviet Aerospace Weapons, and the Armies of the Warsaw Pact Nations. Specific examples of the data are contained in the remainder of this appendix.

AD-A071 968 NAVAL POSTGRADUATE SCHOOL MONTEREY CA F/G 15/7
TACTICAL AIR THREAT QUERY SYSTEM DEMONSTRATION. (U)
MAR 79 W A GEORGE

UNCLASSIFIED NL

2 OF 2
AD
A071968

END
DATE
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8 -79
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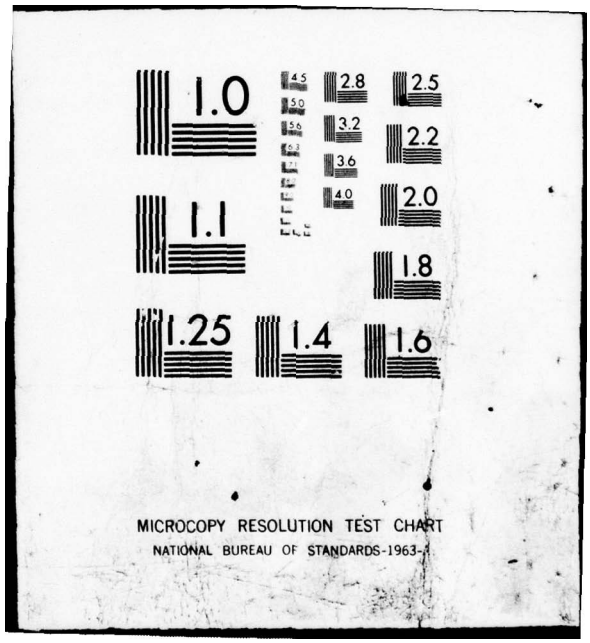
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1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

BOMBER

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Bear B-C	BHC	48.5	47.5	12.1	800	4,000	1 Kangaroo, 6x23mm
•Backfire B	BHD	26.2/ 34.5	40.2	10.1	2,655	5,745	1xkitchen/kingfish or bombs (con/nuc)
•Bear A	BHD	48.5	47.5	12.1	800	6,250	6x23mm, up to 11,400 kg con/nuc
•Brewer A	BLC	13.6	19.7	4.6	1,180	925	1x30mm and up to 2,000 kg msl, bombs or rockets
•Beagle	BLD	21.5	17.7	6.2	900	950	4x23mm and bombs (con/nuc) 3,000 kg
•Badger A	BMC	33.5	36.5	10.8	768	3,180	7x23mm up to 3,000 kg bombs
•Badger G	BMC	33 5	36.5	10.8	768	3,180	2x(Kelt/Kipper/ Kingfish)
•Blinder B	BMC	27.7	40.5	5.2	1,480	1,120	Kitchen
•Blinder A	BMD	27.7	40.5	5.2	1,480	1,120	1 gun and 5,450 kg of bombs (con/nuc)
•Bison A	BMD	50.5	47.0	unk	835	5,600	10x23mm and up to 4,500 kg con/nuc

FIGHTER

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Farmer D	FDA	9.0	12.6	3.8	1,452	685	4xALKAI
•Fiddler	FDA	19.8	27.4	7	1,745	1,600	4xASH (IR & Rad)
•Firebar B	FDA	13.6	20.4	4.6	1,225	800	2xANAB (IR & Rad)
•Fishbed D-F-1	FDA	7.15	14	4.5	2,120	650	1x23mm gun and 2xATOLL
•Fishbed J-K-L-1	FDA	7.15	14	4.5	2,230	500	1x23mm gun, 4xATOLL
•Fishpot C	FDA	9.45	17	4.9	1,915	500	2xANAB (IR & Rad)
•Fishpot B	FDA	9.45	16.8	4.9	1,915	500	4xALKALI or 2xANAB
•Flagon A-D	FDA	9.5	21.5	5	2,655	900	2xANAB (IR & Rad)
•Flagon E	FDA	9.5	21.5	5	2,700	1,000	2xANAB (IR & Rad)
•Flogger B	FDA	7.3/ 14.6	18.3	unk	2,446	1,125	1x23mm gun and 2xApex, 2xAphid
•Foxbat A	FDA	12.5	21.3	6	3,380	1,125	4xACRID (IR & Rad)
•Fresco D-E	FDA	9.6	11.1	3.8	1,125	600	4xALKALI
•Mirage III E	FDA	8.2	15.0	4.3	2,350	1,200	2x30mm guns
•Fishbed C	FDC	7.15	13.5	4.5	2,120	600	1x30mm gun and 2xATOLL
•Sabre	FDC	1.6	5.8	1.7	906	1,646	unk

FIGHTER BOMBER

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Farmer C	FGC	9.0	12.6	3.8	1,452	685	3x30mm guns, bombs and rockets to 500 kg
•Fishbed D-F-2	FGC	7.2	14.0	4.5	2,120	650	1x23mm gun and 2x16 55mm rockets
•Fishbed J-K-L-2	FGC	7.2	14.0	4.5	2,230	500	1x23mm gun and bombs/rockets up to 1,000 kg
•Fresco A-B-C	FGC	9.6	11.1	3.8	1,125	576	3x23mm guns and 500 kg bombs or 4x8 in rocket pod
•Jastreb	FGC	10.6	10.7	3.6	820	750	3xguns, 500 kg bombs
•Kraguj	FGC	10.6	7.9	3.0	280	350	1x7.7mm, 100 kg bombs/150 lb napalm/ 1x12 rocket pod
•Mirage V D	FGC	8.2	15.6	4.3	2,400	1,300	2x30mm or 500 kg bombs/rockets
•Fencer A	FGD	9.5	21.5	unk	2,230	1,200	1x23mm gun and bombs/rockets/msls (kerry) up to 5,000 kg (con/nuc)
•Fitter A	FGD	9.5	17.0	4.7	1,700	450	2x30mm guns and bombs/rockets up to 500 kg (con/nuc)
•Fitter C	FGD	10.5/ 15.3	16.8	4.9	2,000	960	2x30mm guns and bombs/rockets/msls up to 2,700 kg (con/nuc)
•Flogger D	FGD	7.3/ 14.6	18.3	unk	2,446	1,125	1300 kg bombs (con/nuc)
•Forger	FTM	7.0	16.0	4.5	1,245	445	16 or 32 rockets, 2x23mm guns, 2xKerry

HELICOPTER

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Homer	HHC	35.0	37.0	12.5	260	250	35,000 kg cargo
•Alouette III	HLA	11.0	12.8	3.0	190	50	800 kg cargo/ASW/ rockets/7.62mm gun
•Gazelle	HLA	10.5	12.0	3.0	245	340	2xrocket pods of (18/36) 37mm, ASW, 1x7.62mm gun
•Alouette II	HLC	10.2	12.1	2.8	180	50	700 kg cargo
•Hip	HLC	21.3	18.2	5.6	250	215	28 passengers or 4,000 kg cargo or 8x16 57mm rockets
•Hoplite	HLC	14.5	11.4	3.5	210	290	8 passengers or 700 kg cargo or rocket pods
•Hound	HLC	21.0	16.8	5.2	185	100	14 passengers or 1,200 kg cargo or 12.7mm gun
•Hind A	HMA	17.0	17.0	4.3	unk	unk	1x12.7mm gun, 4xSWATTERS and 4x32 57mm rockets
•Hormone	HMA	15.8	9.8	5.4	219	325	ASW torpedoes, nuc depth charges
•Hornet	HMA	18.9	23.0	4.9	245	470	ASW
•Harke	HMC	35.0	32.9	9.9	200	125	15,000 kg cargo
.Hook	HMC	35.0	33.2	9.9	300	310	65-70 passengers or 12,000 kg cargo

RECONNAISSANCE

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Bear D	BHR-E	48.5	47.5	12.1	800	8,000	Cameras/ELINT
•Brewer E	BLE	13.6	19.7	4.6	1,175	800	1x30mm, ECM
•Brewer D	BLR	13.6	19.7	4.6	1,175	800	1x30mm, Camera
•Badger F	BME	33.5	36.5	10.0	768	3,180	ELINT pods
•Badger E	BMR	33.5	36.5	10.8	768	3,180	Cameras
•Moss	EWR	51.2	55.2	unk	unk	unk	AWACS
•Fishbed H	FTE-R	7.2	14.0	4.5	2,230	500	Cameras, IR, and ECM
•Foxbat	FTE-R	12.5	21.3	6.0	3,380	1,125	5 Cameras and ELINT
•Flashlight	FTR	13.6	20.4	4.6	1,125	880	unk
•Sabre R	FTR	1.6	5.8	1.7	906	1,640	Cameras
•Cub C	THE	38.0	37.0	9.8	670	1,500	ELINT, 2x23mm
•Coot A	TLE	37.4	35.9	10.2	650	2,000	ELINT (ECM)

TRAINER

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Blinder D	BMT	27.7	40.5	5.2	1,505	1,120	
•Flagon C	FDT	9.5	21.5	5.0	2,655	900	2xANAB
•Foxbat C	FDT	12.5	21.3	6.0	3,380	1,125	
•Maestro	FDT	14.2	21.7	4.0	1,225	920	
•Maiden	FDT	9.5	16.8	4.9	1,915	500	
•Mongol	FDT	7.2	14.0	4.5	2,230	500	No guns
•Galeb	FGT	10.6	10.7	3.6	740	750	Guns, 8 stations for bombs/rockets
•Maya	FGT	10.3	10.8	3.1	615	445	2xbombs, 8xrockets or 2x7.62mm gun pods
•Midget	FGT	11.0	10.1	3.7	1,010	500	2x23mm or 1x23mm 1x12.7mm; Rockets and bombs up to 200 kg
•Movjik	FGT	8.9	17.4	4.6	1,700	440	
•Mirage III B	FGT	8.2	15.4	4.3	2,350	600	2x30mm guns, 1,000 kg bombs/rockets
•Super Deffin	FGT	9.6	12.3	4.7	745	900	Bombs & rockets
•Flogger C	FTT	14.6	18.3	unk	2,446	1,125	1x23mm and four rockets
•Magister	FTT	11.4	10.1	2.8	715	500	2xguns, up to 75 kg bombs/rockets
•Falcon	FTT	16.3	17.2	5.3	860	1,750	unk

TRANSPORT

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	HEIGHT (m)	MAX SPEED (km/hr)	OPER RADIUS (km)	ARMAMENT
•Candid	THC	50.5	46.6	14.8	900	2,500	40,000 kg cargo and 1 gun
•Cock	THC	64.4	57.8	12.5	740	5,500	80,000 kg cargo
•Cub	THC	38.0	37.0	9.8	670	1,500	16,000 kg cargo/vehicles; 100 paratroops or 120 passengers; 2x23mm guns
•Hercules	THC	40.3	29.8	11.7	618	1,948	Cargo up to 20,412 kg
•Clod	TLC	22.1	11.3	4.6	220	230	Cargo up to 725 kg
•Colt	TLC	18.2	12.7	4.2	256	450	14 passengers
•Cab	TMC	28.5	19.2	5.1	340	1,200	24 passengers or 2,000 kg cargo
•Coke	TMC	29.2	23.5	8.3	448	273	44-52 passengers or 30 paratroops
•Coot	TMC	37.4	35.9	10.2	675	1,850	13,000 kg cargo
•Crate	TMC	31.7	22.3	7.8	430	850	30 passengers or 24 paratroops
•Curl	TMC	29.2	23.5	8.3	540	750	38 passengers or 5,000 kg cargo
•Skytrain	TMC	28.9	19.6	5.2	296	1,200	14,080 kg cargo

NAVAL VESSELS - CRUISERS AND AIRCRAFT CARRIERS

CLASS NAME	TYPE	BEAM (m)	LENGTH (m)	DRAFT (m)	CRUISING SPEED (km/hr)	CRUISING RANGE (km)	ARMAMENT
•Kara	CG	18.3	173.8	6.2	63	3,704	4xGoblet, 4x76mm, 4xgatling guns
•Kresta I	CG	17	155.5	6	37	8,000	2xGoblet, 2xGoa, 4x57mm, 4xgatling guns
•Kresta II	CG	16.8	158.5	6	37	10,000	2xGoblet, 4x57mm, 4xgatling guns, 1xHormone A/B
•Kynda	CG	15.8	142	5.3	37	11,000	2xGoblet, 2xGoa, 4x76mm guns
•Sverdlov	CG	22	210	7.5	37	14,000	2xGuideline, 2xSA-N-4, 12x152mm, 12x100mm, 16x37mm, 8x30mm guns
•Moskva	CHG	35	196.6	7.6	55	4,655	18xHormone, 4xGoblet, 4x57mm
•Kiev	CV	48	274	-	33	20,800	2xGoblet, 2xSA-N-4, 4x76mm guns

NAVAL VESSELS - DESTROYERS AND FRIGATES

CLASS NAME	TYPE	BEAM (m)	LENGTH (m)	DRAFT (m)	CRUISING SPEED (km/hr)	CRUISING RANGE (km)	ARMAMENT
•Kotlin	DD	13	126.5	4.9	59	1852	4x130mm, 16x45mm, 12x25mm guns
•Skory	DD	11.8	120.5	4.6	59	1675	4x130mm, 2x86mm, 8x37mm guns
•Split	DD	11.1	120	3.8	44	--	4x127mm, 12x40mm guns
•Kanin	DDG	14.7	139	5	55	1852	1xGoa, 8x57mm, 8x30mm guns, helo pad
•Kashin	DDG	15.9	144	4.7	60	1670	4xGoa, 4x23mm guns
•Kildin	DDG	13	126.5	4.9	55	1852	4x76mm guns
•Krivak I	DDG	14	123.4	5	59	7410	4xSA-N-4, 4x76mm guns
•Krivak II	DDG	14	127.4	5	59	7410	4xSA-N-4, 2x100mm guns
•Samkotlin II	DDG	13	126.5	4.9	37	7410	1xGoa, 2x130mm, 4x45mm, 8x30mm guns
•Kola	FF	9.5	98	3.2	37	5600	4x100mm, 4x37mm, 4x25mm guns
•Koni	FF	--	100	--	--	--	4x76mm, 2x30mm guns
•Mirka I-II	FF	9.1	82	3	37	7000	4x76mm guns
•Petya	FF	9.1	82	3.2	37	7000	6x76mm guns
•Vosper	FFG	11	94.5	3.4	31	9000	12xSeacat, 1x105mm, 2x40mm, 2x35mm guns

RADARS

CLASS NAME	TYPE	LENGTH (m)	HEIGHT (m)	OPER RANGE (km)	INSTALLATION
•Back Net	EW	-	-	300	Van mounted
•Hen Egg	EW	300	20	3200	Permanent
•Hen Nest	EW	300	20	3200	Permanent
•Hen Roost	EW	300	20	3200	Permanent
•Knife Rest	EW	-	-	350	Truck mounted
•Spoon Rest	EW	-	-	275	Truck mounted
•Tall King	EW	30	55	600	Vehicle mounted
•Barlock	GCI	-	-	300	Van mounted
•Flat Face	GCI	-	-	250	Truck mounted

AIR DELIVERED MISSILES

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	DIAMETER (cm)	TYPE CONTROL	OPER RANGE (km)	CARRIER
•Acrid	AAM	--	6.1	--	IR/RAD	50	Foxbat
•Alkali	AAM	.58	1.88	17.8	RADAR	6-8	Fishpot B, Farmer D Fresco D/E
•Anab	AAM	1.3	4.1	28	IR/RAD	16	Firebar D, Fishpot C Flagon A/D/E
•Apex	AAM	1.05	4.3	24	IR/RAD	27	Flogger B
•Aphid	AAM	--	2.0	13	IR	5.5-8	Flogger B
•Ash	AAM	--	5.5	--	IR/RAD	30	Fiddler
•Atoll	AAM	.45	2.8	12	IR	5-6.5	Fishbed C/D/F/J/K/L
•Kangaroo	ASM	9.15	14.9	185	Radio	650	Bear B/C
•Kelt	ASM	4.57	9.45	100	Anti-Radar	160	Badger G
•Kerry	ASM	--	--	--	Radio	10	Fencer, Forger
•Kingfish	ASM	2.5	10.5	--	Anti-Radar	220	Backfire B, Badger G
•Kipper	ASM	4.88	9.5	90	Radio	213	Badger G
•Kitchen	ASM	2.45	11.3	50	Inertial	300	Backfire, Blinder B
•Swatter	ATM	.65	1.2	14	IR	.22	Hind A/D

SURFACE DELIVERED MISSILES

CLASS NAME	TYPE	WING SPAN (m)	LENGTH (m)	DIAMETER (cm)	TYPE CONTROL	OPER RANGE (km)	CARRIER
•Gainful	SAM	.124	6.2	33.5	Command/ Semi Activ Radar Homing	45	TAC Air Def
•Ganef	SAM	2.6	8.8	90	Command/ Semi Activ Radar Homing	70	TAC Air Def
•Gaskin	SAM	--	--	--	IR	8	TAC Air Def
•Gecko	SAM	--	3.2	21	Command	16	TAC Air Def
•Goa	SAM	--	6.7	60	Command	30	TAC Air Def, Kanin, Kashin, Kotlin, Kresta, Kynda
•Goblet	SAM	.124	6.2	33.5	Command/ Semi Activ Radar Homing	45	Moskva, Kara, Kiev, Kresta II, Krivak
•Grail	SAM	--	1.5	--	Optical/IR	10	TAC Air Def
•Guideline	SAM	--	10.7	70	Command	50	TAC Air Def
•Guild	SAM	--	12	70	--	32	Strat Air Def
•Sea Cat	SAM	--	1.5	--	IR	6	TAC Air Def
•Scaleboard	SSM	--	11.3	100	Inertial	800	Nuclear/HE
•Scud A-B	SSM	--	11.3	85	Inertial	270	Nuclear/HE
•Frog 7	FROG	--	9	55	Unguided	60	Nuclear/HE

APPENDIX D

TYPESCRIPT OF A TYPICAL SESSION

```
QUERYA C: ; The purpose of this typescript is to demonstrate the
QUERYA C: ; user interface capabilities with the QueryAF data-
QUERYA C: ; base.  The typescript represents an actual user
QUERYA C: ; interaction with the database.  Some editing has
QUERYA C: ; been performed in order to satisfy thesis paging
QUERYA C: ; and margin requirements.
QUERYA C:
QUERYA C: ; The first few commands are designed to just orient
QUERYA C: ; the user and demonstrate basic command options
QUERYA C: ; available with QueryAF.
QUERYA C:
QUERYA C: ; By typing a "?" the user can examine the
QUERYA C: ; available command alternatives.
QUERYA C:
Current Alternatives are:
   Add                          How (far is)                 Show
<>Alter                         Include (in task...)      <>Syntax (or Command)
<>Assign                     <>Input                      <>Update (data base...)
<>Assimilate (manua...)      <>Insert (window ed...)      Use (as database)
<>Attach (opcon)             <>Invert                     <>Verify
   Change                       Jump (to)                    Version (of Query)
<>Compute                       Label                        Where (am I?)
<>Deassign (command)         <>List                       Zoom
   Delete                       My (position is)             ;
<>Detach (opcon)                Of (these)                   <
<>Disestablish (tas...)      <>Output                     >
   Establish                    Portray (diagram...)      <CTRL-Q>: HELP
   Execute (command in)      <>Print                      <CTRL-S>: SYNTAX
   Find                      <>Put (type of craft)        <REPEAT>
   Goto (subsystem)             Quit
   Help                      <>Remove (from task...)

---
QUERYA C: ; Note that the "<>" preceding some of the above commands
QUERYA C: ; tell the user that that command must be preceded by a
QUERYA C: ; space before the first letter of the command is typed.
QUERYA C: ; Now let us look specifically at the FIND command and
QUERYA C: ; review the available alternatives.
QUERYA C: Find (all) C:
Current Alternatives are:
<>Aircraft                      Naval (Vessels)              <CTRL-Q>: HELP
   Airfields                    Platforms                    <CTRL-S>: SYNTAX
   Classes                   <>Ports
   Missile (Installat...)       Radar (Installations)
```

```
---Platforms (with) C:
Current Alternatives are:
   Airfield (Location)        Labels                    <>Specific (model n...)
 <>At (range of (# o...))   <>Lgh                         Speed
 <>Between                    Missiles                  <>Status
   Bombs                    <>Model (number)            <>Synonym
 <>Category                 <>More (than (# of...))     <>Tail (number)
   Class                    <>Name                      <>Threat (to)
 <>Course                   <>Nearest (in)                Type
 <>Depth                    <>Not                         Unit (Assignment)
 <>Failing                  <>Port (Location)           <>Width
 <>Farthest (in)              Position                    Within ((# of KM...))
   Flag                       Rockets                   (
   Guns                     <>Satisfying                <CRTL-Q>: HELP
   Hull (number)            <>Sector (Assignment)       <CTRL-S>: SYNTAX

---Within ((# of KM or hrs)) T/[A]: 500
C:
Current Alternatives are:
   Hours (of)                 <CTRL-Q>: HELP
   Kilometers (of)            <CTRL-S>: SYNTAX

---Kilometers (of) C:
Current Alternatives are:
   Me                         <CTRL-Q>: HELP
   Platform                   <CTRL-S>: SYNTAX

---Me OK/C:
(Display format?) C:
Current Alternatives are:
   Graphical                  None                      <CTRL-Q>: HELP
   Long                       Short                     <CTRL-S>: SYNTAX
   Medium                     Tabular

---Tabular OK:
QUERYA C: ; Now that we have reviewed the available commands and
QUERYA C: ; the command structure, the following series of
QUERYA C: ; commands will demonstrate their use and orient
QUERYA C: ; the observer with the database.
QUERYA C:
QUERYA C: Where (am I?) OK:
You are at 40-53N 014-17E in the MEDITERRANEAN;
Database is file <QUERY>DATABASEAF.NLS;46.
QUERYA C: Find (all) C: Airfields (with) C: Name C: Equal (to)
T/[A]: Naples OK/C:
(Display format?) C: Short OK:

NAPLES IT AFLD 40-53N 14-17E
QUERYA C: ; Note our location is Naples airfield.
QUERYA C: Find (all) C: Aircraft (with) C: Flag C: Equal (to) T/[A]: LI
OK/C:
(Display format?) C: Tabular OK:
```

ALOUETTE III	ALOUETTE III	ALOUETTE III	ALOUETTE III
ALOUETTE II	ALOUETTE II	FLOGGER	FLOGGER
FLOGGER	FLOGGER	HERCULES	HERCULES
MAGISTER	MAGISTER	MAGISTER	MAGISTER
MAGISTER	MAGISTER	MIRAGE V	MIRAGE V
MIRAGE V	MIRAGE V	MIRAGE V	MIRAGE V
MIRAGE V	MIRAGE V	MIRAGE V	MIRAGE V
MIRAGE V	MIRAGE V	MIRAGE III	MIRAGE III
MIRAGE III	MIRAGE III	MIRAGE III	MIRAGE III
MIRAGE III	MIRAGE III	MIRAGE V	MIRAGE V
MIRAGE V	MIRAGE V	MIRAGE V	MIRAGE V
MIRAGE III	MIRAGE III	MIRAGE III	MIRAGE III
MIRAGE III	MIRAGE III	MIRAGE V	MIRAGE V
MIRAGE V	MIRAGE V	MIRAGE V	MIRAGE V
SKYTRAIN	SKYTRAIN	SKYTRAIN	SKYTRAIN

QUERYA C: ; I will now demonstrate how to utilize the OF THESE
QUERYA C: ; command to loop back into the just printed data
QUERYA C: ; and perform a limited search on just this data.
QUERYA C: Of (these) C: Show C: Aircraft T/[A]: flogger
(Display format?) C: Medium OK:

NAME=FLOGGER PLAT=A FLAG=LI CLASS=FLOGGER B CAT=FTR TYPE=FDA HUL=6
OPCON=OKBA IBN NAFIA PTP=32-50N 13-18E BEARING=000 MCS=2446.0 RANGE=1125

NAME=FLOGGER PLAT=A FLAG=LI CLASS=FLOGGER B CAT=FTR TYPE=FDA HUL=6
OPCON=OKBA IBN NAFIA PTP=32-50N 13-18E BEARING=000 MCS=2446.0 RANGE=1125

NAME=FLOGGER PLAT=A FLAG=LI CLASS=FLOGGER B CAT=FTR TYPE=FDA HUL=6
OPCON=OKBA IBN NAFIA PTP=32-50N 13-18E BEARING=000 MCS=2446.0 RANGE=1125

NAME=FLOGGER PLAT=A FLAG=LI CLASS=FLOGGER B CAT=FTR TYPE=FDA HUL=6
OPCON=OKBA IBN NAFIA PTP=32-50N 13-18E BEARING=000 MCS=2446.0 RANGE=1125
QUERYA C: ; Note the floggers are all located at a specified airfield.
QUERYA C: ; We can key on this record and find what aircraft are
QUERYA C: ; located at other airfields.
QUERYA C: Find (all) C: Aircraft (with) C: Airfield (Location)
C: Equal (to) T/[A]: Tripoli
OK/C:
(Display format?) C: Short OK:

BLINDER UR BMC 32-40N 13-10E
BLINDER UR BMC 32-40N 13-10E
HERCULES LI THC 32-40N 13-10E
HERCULES LI THC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
SKYTRAIN LI TMC 32-40N 13-10E
SKYTRAIN LI TMC 32-40N 13-10E
SKYTRAIN LI TMC 32-40N 13-10E
SKYTRAIN LI TMC 32-40N 13-10E

```
QUERYA C: ; Two of the above aircraft are Soviet so let's take a
QUERYA C: ; more detailed look at those aircraft.
QUERYA C: Of (these) C: Show C: Aircraft T/[A]: Blinder
(Display format?) C: Long OK:

NAME=BLINDER PLAT=A FLAG=UR CLASS=BLINDER B CAT=BOM TYPE=BMC HUL=6
OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000 MCS=1480.0 RANGE=1120
LGH=40.5 WIDTH=27.7 DEPTH=5.2 GUNS=0 MISSL=1 ROCKETS=0 BOMBS=0

NAME=BLINDER PLAT=A FLAG=UR CLASS=BLINDER B CAT=BOM TYPE=BMC HUL=6
OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000 MCS=1480.0 RANGE=1120
LGH=40.5 WIDTH=27.7 DEPTH=5.2 GUNS=0 MISSL=1 ROCKETS=0 BOMBS=0
QUERYA C: ; These are Blinder B's carrying air to surface missiles.
QUERYA C: ; To quickly see if they are in range of our position
QUERYA C: ; we use the HOW FAR command.
QUERYA C: How (far is) C: Aircraft T/[A]: Blinder
(from) C: Me OK:
(in) C: Kilometers OK:
Bearing of 187 Degrees at Range of 918 Kilometers.
QUERYA C: ; A quick comparison with the Blinder's combat radius
QUERYA C: ; range (1120 km) indicates they are a potential threat.
QUERYA C:
QUERYA C: ; Queries on other platforms are also possible as
QUERYA C: ; demonstrated by the next series of commands.
QUERYA C: Find (all) C: Missile (Installations) (with) C: Type C:
Equal (to) T/[A]: SSM
OK/C: And C: Flag C: Equal (to) T/[A]: HU
OK/C:
(Display format?) C: Medium OK:

NAME=SCUD PLAT=M FLAG=HU CLASS=SCUD A-B CAT=MIS TYPE=SSM HUL=6
OPCON=4TH BRIGADE PTP=46-04N 18-15E BEARING=000 RANGE=270

NAME=SCUD PLAT=M FLAG=HU CLASS=SCUD A-B CAT=MIS TYPE=SSM HUL=6
OPCON=4TH BRI ADE PTP=46-04N 18-15E BEARING=000 RANGE=270

NAME=SCUD PLAT=M FLAG=HU CLASS=SCUD A-B CAT=MIS TYPE=SSM HUL=6
OPCON=2ND BRIGADE PTP=47-08N 18-25E BEARING=000 RANGE=270

NAME=SCUD PLAT=M FLAG=HU CLASS=SCUD A-B CAT=MIS TYPE=SSM HUL=6
OPCON=2ND BRIGADE PTP=47-08N 18-25E BEARING=000 RANGE=270
QUERYA C: Find (all) C: Radar (Installations) (with) C: Within
((# or KM or hrs)) T/[A]: 400
C: Kilometers (of) C: Platform T/[A]: Aviano
OK/C:
(Display format?) C: Short OK:

BARLOCK HU GCI 46-52N 16-47E
   (Bearing of 072 Degrees at Range of 333 Kilometers.)
BARLOCK HU GCI 46-52N 16-47E
   (Bearing of 072 Degrees at Range of 333 Kilometers.)
FLAT FACE HU GCI 46-15N 17-07E
   (Bearing of 084 Degrees at Range of 349 Kilometers.)
```

```
FLAT FACE HU GCI 46-15N 17-07E
   (Bearing of 084 Degrees at Range of 349 Kilometers.)
TALL KING HU EW 46-50N 17-10E
   (Bearing of 074 Degrees at Range of 361 Kilometers.)
TALL KING HU EW 46-50N 17-10E
   (Bearing of 074 Degrees at Range of 361 Kilometers.)
QUERYA C: ; In order to demonstrate the users ability to maintain
QUERYA C: ; the database, the next few commands will ADD a
QUERYA C: ; platform, change its location (PUT command), change
QUERYA C: ; a parameter, verify its position and then DELETE
QUERYA C: ; the platform.
QUERYA C: Add C: Aircraft
(Field(s) may be specified as unknown--UNK)
(Name=) T/[A]: Fencer
(Flag--e.g. US=) T/[A]: UR
(Class=) T/[A]: Fencer A
(Category=) C: Fighter-Bomber OK:
(Type--e.g. =) T/[A]: FGD
(Tail number=) T/[A]: UNK
(Position=) T/[A]: UNK
(Bearing=) T/[A]: 0
(Speed= (KM/hrs)) T/[A]: 1700
(Combat radius (Km)=) T/[A]: 1200
(Airfield location=) T/[A]: UNK
QUERYA C: Show C: Aircraft T/[A]: Fencer
(Display format?) C: Long OK:

NAME=FENCER PLAT=A FLAG=UR CLASS=FENCER A CAT=FIB TYPE=FGD HUL=UNK
PTP=UNK BEARING=000 MCS=1700.0 RANGE=1200 LGH=UNK WIDTH=UNK DEPTH=UNK
QUERYA C: Add C: Dimensions (to class) T/[A]: Fencer A
(Field(s) may be specified as unknown--UNK)
(Length (meters)=) T/[A]: 21.5
(Width=) T/[A]: 9.5
(Depth=) T/[A]: UNK
QUERYA C: Add C: Weaponry (to) C: Aircraft (Class) T/[A]: Fencer A
(Field(s) may be specified as unknown--UNK)
(Guns: number/type in mm list separated by commas--) T/[A]: 1
(Bombs: capacity in Kilograms) T/[A]: 5000
(Missiles: number/class list separated by commas=) T/[A]: 0
(Rockets: number/size list separated by commas=) T/[A]: 16
QUERYA C: Show C: Aircraft T/[A]: Fencer
(Display format?) C: Long OK:

NAME=FENCER PLAT=A FLAG=UR CLASS=FENCER A CAT=FIB TYPE=FGD HUL=UNK
PTP=UNK BEARING=000 MCS=1700.0 RANGE=1200 LGH=21.5 WIDTH=9.5 DEPTH=UNK
GUNS=1 MISSL=0 ROCKETS=16 BOMBS=5000
QUERYA C: Put (type of craft) C: Aircraft T/[A]: Fencer
(at) C: Airfield T/[A]: Kunmadaras
QUERYA C: Show C: Aircraft T/[A]: Fencer
(Display format?) C: Medium OK:
```

```
NAME=FENCER PLAT=A FLAG=UR CLASS=FENCER A CAT=FIB TYPE=FGD HUL=UNK
PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=1200
QUERYA C: ; Note the PUT command automatically moves the aircraft
QUERYA C: ; to the designated airfield and applies the correct
QUERYA C: ; coordinate. Now that we know the operation airfield
QUERYA C: ; we can change the airfield location parameter from
QUERYA C: ; UNK to Kunmadaras.
QUERYA C: Change C: Aircraft T/[A]: Fencer
(Specify parameter(s) to be changed)
OK/C: Airfield (Location) T/[A]: Kunmadaras
OK/C:
QUERYA C: Find (all) C: Aircraft (with) C: Airfield (Location)
C: Equal (to) T/[A]: Kunmadaras
OK/C:
(Display format?) C: Medium OK:

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=10
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=5
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=FITTER PLAT=A FLAG=HU CLASS=FITTER A CAT=FIB TYPE=FGD HUL=5
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=450

NAME=MAYA PLAT=A FLAG=HU CLASS=MAYA CAT=TRA TYPE=FGT HUL=4
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=615.0 RANGE=445

NAME=MAYA PLAT=A FLAG=HU CLASS=MAYA CAT=TRA TYPE=FGT HUL=4
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=615.0 RANGE=445
```

```
NAME=MAYA PLAT=A FLAG=HU CLASS=MAYA CAT=TRA TYPE=FGT HUL=5
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=615.0 RANGE=445

NAME=MAYA PLAT=A FLAG=HU CLASS=MAYA CAT=TRA TYPE=FGT HUL=5
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=615.0 RANGE=445

NAME=FENCER PLAT=A FLAG=UR CLASS=FENCER A CAT=FIB TYPE=FGD HUL=UNK
OPCON=KUNMADARAS PTP=47-24N 20-47E BEARING=000 MCS=1700.0 RANGE=1200
QUERYA C: ; To delete platforms type,
QUERYA C: Delete C: Aircraft T/[A]: Fencer
(Finished?) C: Yes OK:
QUERYA C: Show C: Aircraft T/[A]: Fencer
(Display format?) C: Long OK:
No aircraft with NAME = FENCER.
QUERYA C: ; To speed up data search the user can establish a sub-
QUERYA C: ; database and apply the same QueryAF commands to only the
QUERYA C: ; smaller subdatabase.  The next few commands will
QUERYA C: ; establish a subdatabase called southern threat and
QUERYA C: ; perform a series of queries against the database,
QUERYA C: ; then return to the original main database.
QUERYA C: Find (all) C: Aircraft (with) C: Flag C: Equal (to)
T/[A]: LI
OK/C:
(Display format?) C: Tabular OK:

ALOUETTE III     ALOUETTE III     ALOUETTE III     ALOUETTE III
ALOUETTE II      ALOUETTE II      FLOGGER          FLOGGER
FLOGGER          FLOGGER          HERCULES         HERCULES
MAGISTER         MAGISTER         MAGISTER         MAGISTER
MAGISTER         MAGISTER         MIRAGE V         MIRAGE V
MIRAGE V         MIRAGE V         MIRAGE V         MIRAGE V
MIRAGE V         MIRAGE V         MIRAGE V         MIRAGE V
MIRAGE V         MIRAGE V         MIRAGE III       MIRAGE III
MIRAGE III       MIRAGE III       MIRAGE III       MIRAGE III
MIRAGE III       MIRAGE III       MIRAGE V         MIRAGE V
MIRAGE V         MIRAGE V         MIRAGE V         MIRAGE V
MIRAGE III       MIRAGE III       MIRAGE III       MIRAGE III
MIRAGE III       MIRAGE III       MIRAGE V         MIRAGE V
MIRAGE V         MIRAGE V         MIRAGE V         MIRAGE V
SKYTRAIN         SKYTRAIN         SKYTRAIN         SKYTRAIN
QUERYA C: Label C: These T/[A]: southern threat
QUERYA C: Use (as database) C: Group (labelled) T/[A]: southern threat
You are at 40-53N 014-17E in the MEDITERRANEAN;
Database is SOUTHERN THREAT portion of file <QUERY>DATABASEAF.NLS;46,
which has been modified since last UPDATE or DELETE CHANGES.
QUERYA C: ; All queries will now be directed only against the
QUERYA C: ; above aircraft.
QUERYA C: Find (all) C: Aircraft (with) C: Name C: Equal (to) T/[A]:
Fishbed
OK/C:
(Display format?) C: Short OK:
No aircraft with NAME = FISHBED.
QUERYA C: Find (all) C: Aircraft (with) C: Type C: Equal (to) T/[A]:
FGC
OK/C:
(Display format?) C: Short OK:
```

```
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-40N 13-10E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-50N 13-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 32-06N 20-18E
MIRAGE V LI FGC 31-51N 23-55E
MIRAGE V LI FGC 31-51N 23-55E
MIRAGE V LI FGC 31-51N 23-55E
MIRAGE V LI FGC 31-51N 23-55E
MIRAGE V LI FGC 31-51N 23-55E
MIRAGE V LI FGC 31-51N 23-55E
QUERYA C: Show C: Aircraft T/[A]: Skytrain
(Display format?) C: Medium OK:

NAME=SKYTRAIN LABELS=SOUTHERN THREAT PLAT=A FLAG=LI CLASS=SKYTRAIN
CAT=TRN TYPE=TMC HUL=4 OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000
MCS=296.0 RANGE=1200

NAME=SKYTRAIN LABELS=SOUTHERN THREAT PLAT=A FLAG=LI CLASS=SKYTRAIN
CAT=TRN TYPE=TMC HUL=4 OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000
MCS=296.0 RANGE=1200

NAME=SKYTRAIN LABELS=SOUTHERN THREAT PLAT=A FLAG=LI CLASS=SKYTRAIN
CAT=TRN TYPE=TMC HUL=5 OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000
MCS=296.0 RANGE=1200

NAME=SKYTRAIN LABELS=SOUTHERN THREAT PLAT=A FLAG=LI CLASS=SKYTRAIN
CAT=TRN TYPE=TMC HUL=5 OPCON=TRIPOLI PTP=32-40N 13-10E BEARING=000
MCS=296.0 RANGE=1200
QUERYA C: ; We will now return to the main program.
QUERYA C: Use (as database) C: Original (file) OK:
(What is your position?) T/[A]:
You are at 40-53N 014-17E in the MEDITERRANEAN;
Database is file <QUERY>DATABASEAF.NLS;46,
which has been modified since last UPDATE or DELETE CHANGES.
QUERYA C: ; The next few commands demonstrate the threat
QUERYA C: ; algorithm of the QueryAF program.
QUERYA C: ; The first threat will be the interceptor threat
QUERYA C: ; against an F-4 stationed at Aviano Airfield.
```

```
QUERYA C: Show C: Threat (to) C: Aircraft (Kind of threat:)
C: Interceptor (threats to aircraft) T/[A]: F-4
(Display format?) C: Short OK:
Detailed search of 43 records is 0% complete; 0 records found
so far.
FISHBED HU FDA 46-40N 17-08E
   (Bearing of 077 Degrees at Range of 355 Kilometers.)
FISHBED HU FDA 46-40N 17-08E
   (Bearing of 077 Degrees at Range of 355 Kilometers.)
FISHBED HU FDA 46-40N 17-08E
   (Bearing of 077 Degrees at Range of 355 Kilometers.)
FISHBED HU FDA 46-40N 17-08E
   (Bearing of 077 Degrees at Range of 355 Kilometers.)
FARMER HU FDA 47-22N 17-32E
   (Bearing of 067 Degrees at Range of 404 Kilometers.)
FARMER HU FDA 47-22N 17-32E
   (Bearing of 067 Degrees at Range of 404 Kilometers.)
FARMER HU FDA 47-22N 17-32E
   (Bearing of 067 Degrees at Range of 404 Kilometers.)
FARMER HU FDA 47-22N 17-32E
   (Bearing of 067 Degrees at Range of 404 Kilometers.)
FISHBED UR FDA 46-23N 17-55E
   (Bearing of 083 Degrees at Range of 411 Kilometers.)
FISHBED UR FDA 46-23N 17-55E
   (Bearing of 083 Degrees at Range of 411 Kilometers.)
FISHBED UR FDA 46-23N 17-55E
   (Bearing of 083 Degrees at Range of 411 Kilometers.)
FISHBED UR FDA 46-23N 17-55E
   (Bearing of 083 Degrees at Range of 411 Kilometers.)
FISHBED UR FDA 46-23N 17-55E
   (Bearing of 083 Degrees at Range of 411 Kilometers.)
FISHBED UR FDA 47-04N 17-58E
   (Bearing of 072 Degrees at Range of 426 Kilometers.)
FISHBED UR FDA 47-04N 17-58E
   (Bearing of 072 Degrees at Range of 426 Kilometers.)
FISHBED UR FDA 47-04N 17-58E
   (Bearing of 072 Degrees at Range of 426 Kilometers.)
FISHBED UR FDA 47-04N 17-58E
   (Bearing of 072 Degrees at Range of 426 Kilometers.)
FISHBED UR FDA 47-04N 17-58E
   (Bearing of 072 Degrees at Range of 426 Kilometers.)
FISHBED UR FDA 46-04N 18-57E
   (Bearing of 087 Degrees at Range of 490 Kilometers.)
FISHBED UR FDA 46-04N 18-57E
   (Bearing of 087 Degrees at Range of 490 Kilometers.)
QUERYA C: ; The next threat demonstration will include
QUERYA C: ; sending the Query results to a file and the
QUERYA C: ; dissemination of the data via message.
QUERYA C: Show C: Threat (to) C: Airfield (Kind of threat:)
C: Nuclear (air attack threats to airfield) T/[A]: Aviano
(Display format?) C: Tabular OK:
Detailed search of 12 records is 0% complete; 0 records found
so far.
```

```
BEAGLE          BEAGLE          BEAGLE          BEAGLE
BEAGLE          BEAGLE          BEAGLE
QUERYA C: Output C: These (to) C: File T/[A]: Threat
(Display format?) C: Medium OK:
Output of 7 records beginning.
QUERYA C: ; We will now go to the message mode and
QUERYA C: ; transmit the message.  Note the addressees
QUERYA C: ; are pre-prepared and on file.
QUERYA C: Goto (subsystem) C: Tenex OK:
Office-2 Tenex 1.34.9, Office-2 Exec 1.53.35
@MSG

   MSG -- version of 15 May 1978
   Type ? for help, ? # for news

<- sndmsg [Confirm]

   [control-N aborts back to MSG]

To (? for help): (Insert file: action
...EOF)

cc (? for help): (Insert file: info
...EOF)

Subject: Threat Demo

Message (? for help):
The current threat to Aviano Air Base is:

(Insert file or invoke editor (F, E, or ?)? f)
(Insert file: Threat
...EOF)

This headquarters will provide updates to the above
when available. ^Z

Q,S,?,carriage-return:

SCHILL at ISIE -- ok
POOCK at ISIE -- ok
LEHTMAN at OFFICE-2 -- ok
BGEORGE -- ok
   You have new messages
 + 55   6 Apr  To:  SCHILL at ISIE, Threat Demo (870 chrs)
   current message is 54 of 55 messages

<- ;The message has now been disseminated.  We can review the
<- ;message content in the following manner.
<- Type 55
(msg. # 55, 870 chars)
Date: 6 Apr 1979 2002-PST
From: QueryA
Subject: Threat Demo
```

To: SCHILL at ISIE, POOCK at ISIE
cc: LEHTMAN at OFFICE-2, BGEORGE

The current threat to Aviano Air Base is:

BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)
BEAGLE UR BLD 47-20N 18-58E
(Bearing of 071 Degrees at Range of 506 Kilometers.)

This headquarters will provide updates to the above
when available.

<- ; We now have the option of returning to the main program.
This typescript has served as a brief demonstration
of the user interface capabilities with Query AF.
Many other simple examples could be presented but
will not be due to limitations of space.

APPENDIX E - DATABASE EXTRACT

AND

APPENDIX F - QUERY AF PROGRAM

Both the database extract and the Query AF program are in excess of several hundred pages. For convenience of reproduction and distribution, these appendicies have been retained at the Naval Postgraduate School. Individuals desiring greater information should contact Dr. G. K. Poock, Naval Postgraduate School, Monterey, California 93940.

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